



Quarter Century of Dieselization Page 19

RAILWAY

LOCOMOTIVES AND CARS

A SIMMONS BOARDMAN TIME-SAVER PUBLICATION

DECEMBER 1958

Burlington Builds Its Own Page 30



FOUNDED
1832
AMERICA'S
OLDEST
TRADE PAPER

Special Report: Burlington's Mechanical Department Operations



Merry Christmas



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CHICAGO



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REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

The Engineer's Field Report

CASE HISTORY
Chevron Starting Fluid
 PRODUCT
Great Northern Railway
 FIRM *Harre, Montana*

Special fluid starts 250-ton crane instantly, saves time in emergencies—even at 50° below



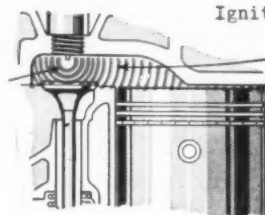
GREAT NORTHERN RAILWAY'S 250-TON, RAILROAD CRANE (above) starts instantly with Chevron Starting Fluid in temperatures ranging to 50° below zero—even after standing idle for months at a time. Former steam-powered wrecker equipment took crew 12 hours to start. This crane with its two 174 h.p. Cummins diesel engines is now available for derailment emergencies on short notice.

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Ignition temperature
 several hundred
 degrees lower
 than diesel
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FREE FOLDERS tell more about the Chevron Starting Fluid and Chevron Pressure Primer System. Write or ask for them.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
 THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso
 THE CALIFORNIA COMPANY, Denver 1, Colorado

RAILWAY

LOCOMOTIVES AND CARS

The Oldest Trade Paper
In the United States

DECEMBER 1958—VOL. 132 NO. 12

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REPORT FOR DECEMBER

Turbines and Diesels In Multiple

Union Pacific's turbine No. 61 has been coupled to two GP-9's. Two other 4,500-hp turbines are running coupled back-to-back in multiple. Three GE 7,000-hp units are now in service.

Proper Oil Level in Journal Boxes Equipped with Lubricating Devices

The AAR Mechanical Division in a recent circular has issued the following instructions to serve as AAR Recommended Practice at this time insofar as journal boxes equipped with journal lubricating devices.

"If any free oil is visible in the bottom of the journal box, no further oiling is necessary. However, if there is no indication of free oil in the bottom of the journal box, a sufficient amount of oil should be added to leave 1/2 in. of free oil in the bottom of the box.

"This does not apply to boxes equipped with Hennessy mechanical type 'AR' and 'ARX' lubricators which should have the oil level maintained to the top of the oil gauge in accordance with the manufacturer's instructions, nor does it change existing instructions with respect to maintenance of oil level in journal boxes using waste packing."

It is to be understood that this circular is not intended to discourage the necessary practice of free oiling of journal boxes, but rather to discourage the habit in some locations of putting too much oil in such boxes,

thereby resulting in waste and splashing of oil on rails which is detrimental to train operations. The AAR suggests these instructions be placed in the hands of all forces concerned with the free oiling of journal boxes.

Riveted Type Coupler Yokes

The Arbitration Committee of the AAR has extended the effective date of replacement of riveted type coupler yokes with cast steel yokes from March 1, 1958 to January 1, 1960. The committee requests the quarterly reports covering replacements be continued during 1959. It is expected that no further extension beyond the above date will be granted.

Miscellaneous Publications

REFRIGERATOR CAR RESEARCH.—AAR Mechanical Research Division Report MR-289 discusses seven factors related to establishing a standard floor rack height for refrigerator cars equipped with overhead fans. By using known information on air pressure loss in rectangular ducts and referring to electric fan performance data in Report MR-230, the effect of floor rack height on the volume of air flow within a refrigerator car can be calculated. W. M. Keller, vice-president, Research Center, Association of Amer-

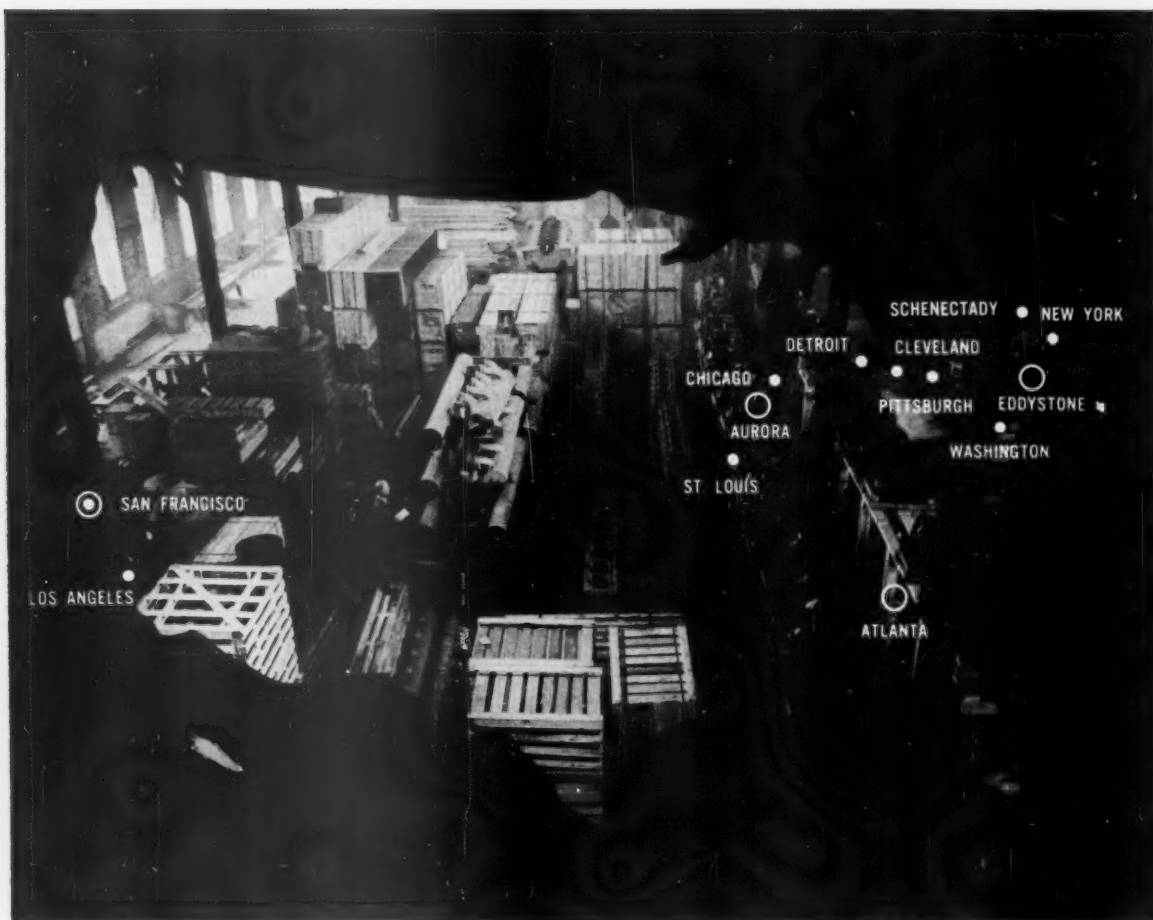
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SPECIAL REPORT: BURLINGTON MECHANICAL DEPARTMENT

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Today, as always, Baldwin provides the ultimate in both parts and service for its thousands of diesel locomotives throughout the world. Only from us can you get exact duplicates of the original components of your Baldwin locomotive. Each Baldwin renewal part is made, like the original, by skilled workers and to the same high

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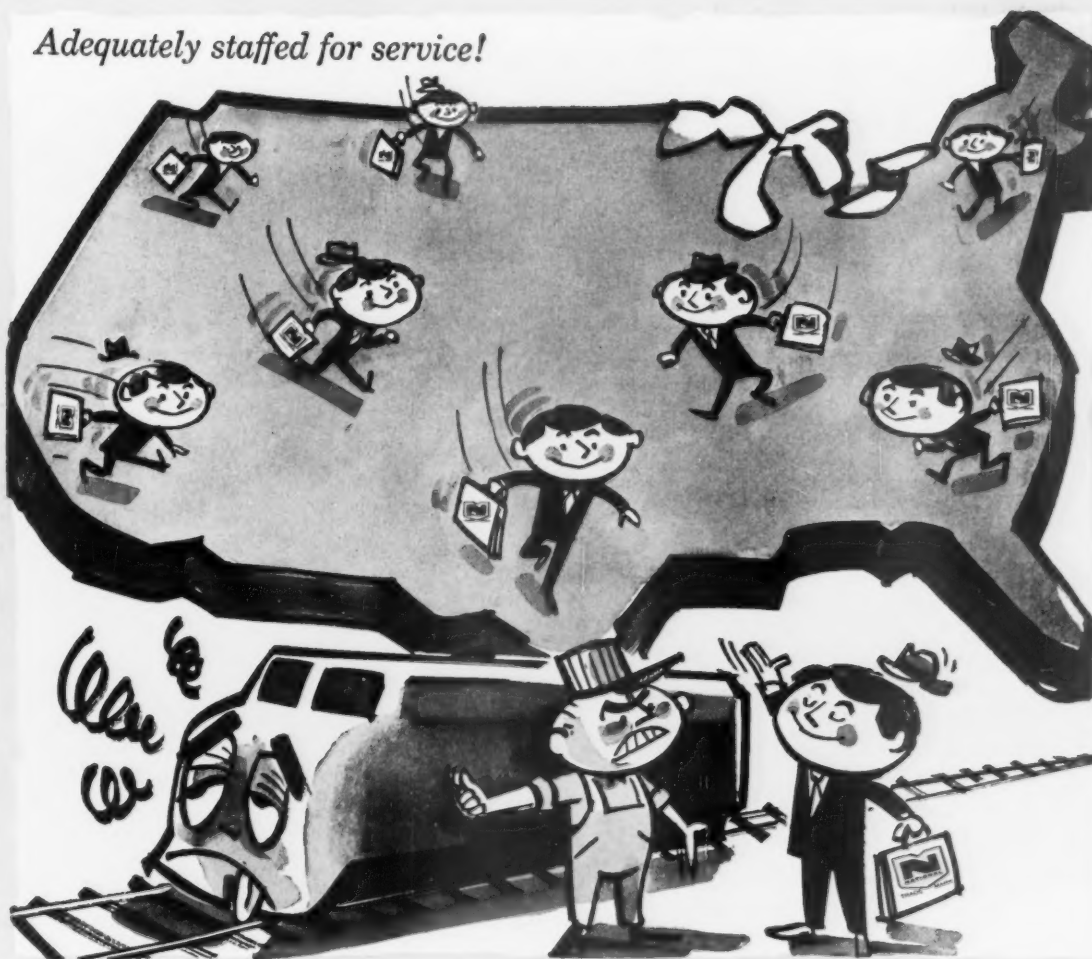
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A railroad had both mechanical and electrical problems causing excessive maintenance on diesel traction motors, says "National" Carbon Technical Serviceman, Ken Matz.

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adopted by the railroad.

Subsequent inspections by Ken, Floyd Anderson and John Gibb substantiated his recommendation. Once again, this demonstrates the thoroughness with which your "National" Carbon Brush Men handle railroad brush problems. There are twenty-six of these specialists throughout the country ready to serve you. For information call or write: National Carbon Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, New York.

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REPORT FOR DECEMBER—Continued from page 5

ican Railroads, 3140 South Federal st., Chicago 16. Price: To members, 50 cents; to others \$1.00.

AAR SPECIFICATIONS FOR TANK CARS.—Revised Specifications for Tank Cars—Issue No. 1, July 1958—supersedes previous edition of August 1956. AAR Committee on Tank Cars believes that all concerned should have full knowledge of the new requirements, particularly those pertaining to tank cars handling newly developed liquid products and chemicals. *F. H. Stremmel, secretary, Mechanical Division, Association of American Railroads, 59 East Van Buren st., Chicago 5.* Price: To members and others, 100 copies or more, per 100, \$110.00; 20 copies, \$57.50; one copy \$1.25. Covers 20 cents each.

NEW WELDING SYMBOLS.—New Standard Welding Symbols incorporates additional symbols needed to describe new processes and new types of welds—symbols for spot and seam welds made by arc welding, for types of welds used in structural steel fabrication, etc. Table provides a new system for designating welding and cutting processes by means of letters, a system covering 37 commercially used welding processes. Chart of Welding Symbols redesigned to incorporate new developments and simplify recognition of symbols.

American Welding Society, Department T, 33 West 39th st., New York 18. Price of booklet, \$3. Chart for wall use, \$1.50; for desk use, 50 cents.

Letters to the Editor

Combustion Characteristics Of Economy Fuels

TO THE EDITOR:

We were very pleased to note that the September 1958 issue of *Railway Locomotives and Cars* contains an abstract of our ASME Paper 58-OGP-14, "Performance of Economy Diesel Fuels in a Railroad Locomotive-Type Diesel Engine." We would like to make one comment regarding the information appearing in this article.

Table 2 of the paper appears in your abstract under the heading "Here Are the Results of the Test." Several people have questioned the power output data shown for 30 and 35 cetane fuels at the standard rack setting (24/64 in.). Apparently, an erroneous impression has been created by these data—that the 35 cetane fuel produced more power than the 30 cetane fuel.

We wish to point out that the data presented in Table 2 of the paper represents the results of test runs at one fuel rack setting

Orders and Inquiries for New Equipment

Placed Since the Closing of the November Issue

Diesel-Electric Locomotive Orders

Road and builder	No. of units	Horse-power	Service	Other detail
CHICAGO, ROCK ISLAND & PACIFIC: Electro-Motive	8	1,750	Road switch.	GP-9's. Cost, \$1,379,000. For delivery second quarter 1959.
ILLINOIS CENTRAL: Electro-Motive	20	1,750	Road switch.	For delivery this month.
SOUTHERN PACIFIC: Alco Products	70	1,750	—	70 units in this order to be delivered by next June.
Electro-Motive		1,800	—	

Freight Car Orders

Road and builder	No. of cars	Type of car	Cap. tons	Other detail
CHESAPEAKE & OHIO: ACF Industries	50	Flat	70	85-ft. Cost about \$15,000 per unit. Delivery to begin in February.
CHICAGO, ROCK ISLAND & PACIFIC: Pullman-Standard	100	Box	50	50-ft. Total cost, \$890,000. For delivery first quarter 1959.
DULUTH, SOUTH SHORE & ATLANTIC: Pullman-Standard	1	Box	—	PS-1. Cost, \$7,974. For delivery this month.
MINNEAPOLIS & ST. LOUIS: Pullman-Standard	20	Covered hopper	70	Delivered in November.
NORFOLK & WESTERN: Pullman-Standard	25	Box	50	Delivered in November.
SOUTHERN PACIFIC: General American	100	Flat	—	85-ft. Clejan type. For February delivery.
UNION TANK CAR CO.: Company shops	42	Tank	—	Class 105. For delivery first quarter 1959.

Passenger Car Orders

Road and builder	No. of cars	Type of car	Other detail
NEW YORK TRANSIT AUTHORITY: ACF Industries	110	Subway	Cars will have Axiflo ventilating systems and truss plate floors. Authority ordering also 20 sets of Adirondack trucks from ACF.

Notes and Inquiries

LOCOMOTIVES:
New York, Chicago & St. Louis arranging to place order for 35 diesel locomotives at an estimated cost of \$6,500,000.

FREIGHT CARS:
Baltimore & Ohio converting 10 additional flat cars for use in piggyback service.

PASSENGER CARS:
Illinois Central has acquired eight lightweight sleeping cars from New York Central at a cost of approximately \$100,000. Purchase includes four 10-roomette, 5-bedroom cars, and four 4-compartment, 4-bedroom, 2-drawing room cars.

PASSENGER TRAINS:
Chicago, Rock Island & Pacific has bought GM's two Aerotrains for Chicago-Joliet, Ill., suburban service. Trains will be called "Suburbanites."

and were included in the paper as an example of the test data obtained. Minor variations in test results at any one test condition (fuel rack setting) would be expected to occur in tests of this type. The performance of the fuels in terms of power output is expressed more accurately by the results of tests over a range of fuel rack settings which are il-

TABLE 4—COMPARATIVE POWER OUTPUT OF ECONOMY FUELS AND REGULAR 2D TYPE FUEL AT STANDARD FUEL RACK SETTING (¾ in.)

Fuel	Per cent increase over 2D fuel
35 cetane number	4.4
30 cetane number	5.4
Blend A	10.4
Blend B	8.4
Blend C	5.8
Heavy distillate fuel	9.7

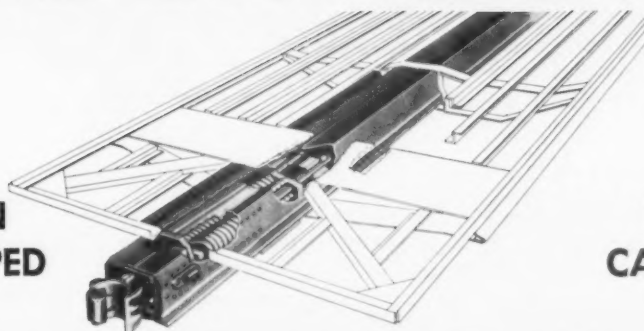
lustrated by the curves of Fig. 3, of the paper. These curves show that the 30 cetane fuel, which has a higher heat content per gallon than the 35 cetane fuel, produced more power than the 35 cetane fuel over a range of fuel rack settings. This is indicated by the text of the paper and by the summary presented in Table 4 which was derived from the curves shown in Fig. 3 and 4.

We hope that this information will correct any erroneous impressions created regarding the performance of these fuels, and we will appreciate any efforts you may make to clarify this point. Again, we would like to express our appreciation to you for publishing an abstract of our paper in your journal.

**T. A. Kramer and
D. P. Osterhout, Jr.**
Supervising technologists,
Research and Development Laboratory,
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SAFEGUARDS LADING with WAUGH CUSHION UNDERFRAMES



**200 70-TON
CARS EQUIPPED**

**125 50-TON
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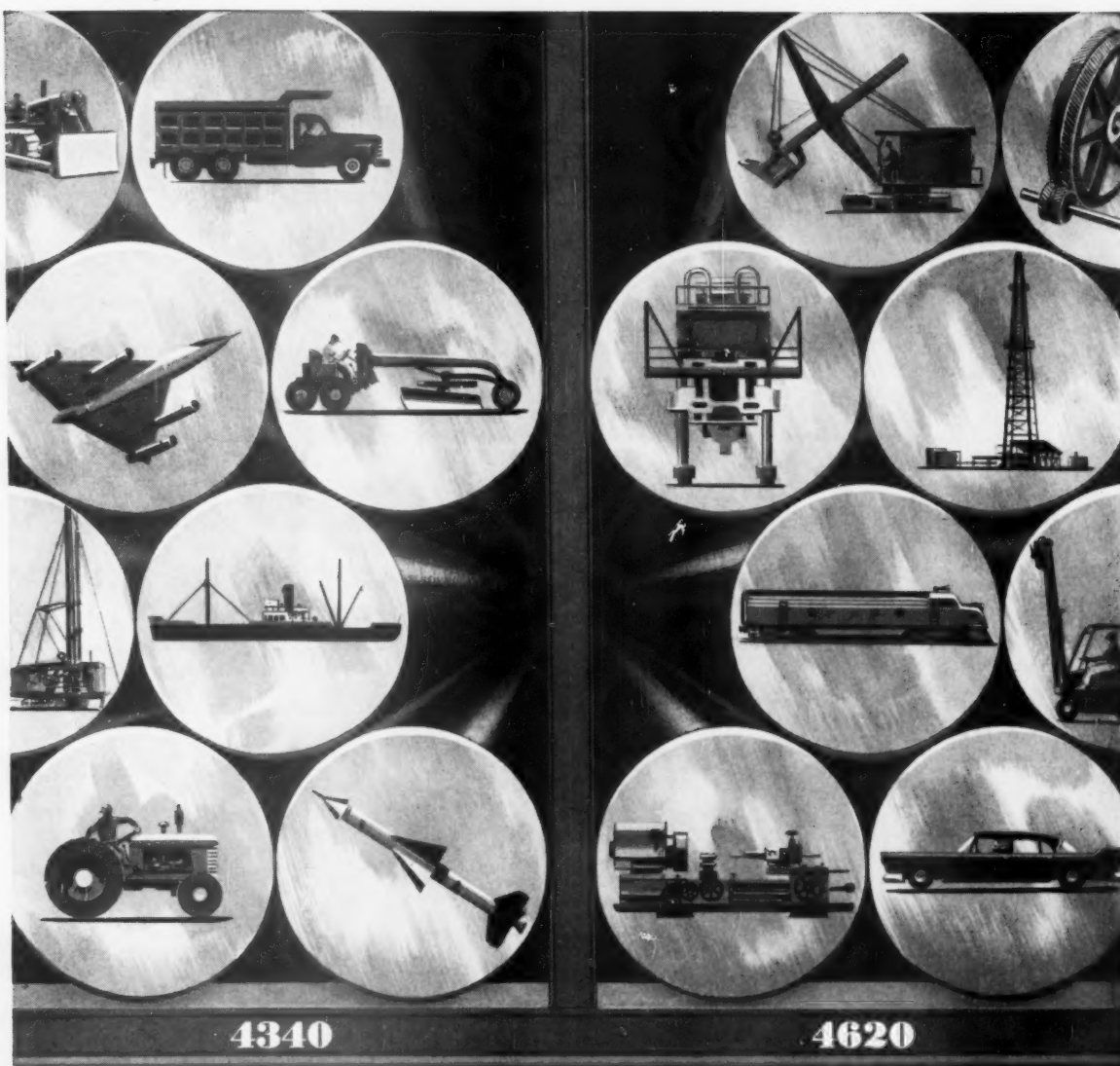
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4340 stands alone among medium carbon steels in its ability to provide maximum strength, ductility, toughness and resistance to fatigue in parts of medium to heavy cross section.

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4620 is a carburizing type that has consistently proved itself the ideal steel for a wide variety of carburized parts. 4620 is easy to carburize and has a minimum tendency toward distortion in heat treatment.



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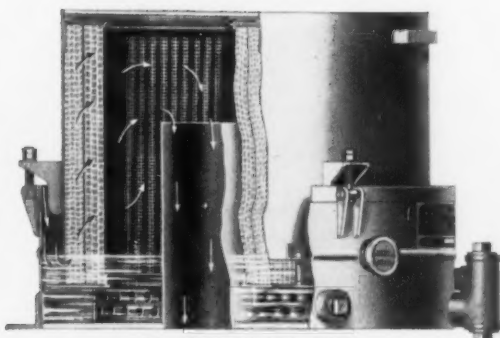
longer life

for your locomotive diesels

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oil bath or panelbath filters



Air-Maze Oil Bath Filter
for efficient filtration at low maintenance expense.



Air-Maze Panelbath Filter
for effective filtration at low initial cost.

Which should you use? One or both of these Air-Maze filters has the economic answer to your locomotive requirements. Evaluate the advantage of each filter under your operating conditions.

OIL BATH FILTER—Removes 92% or more of all objectionable dirt...has exceptionally high dirt-holding capacity...requires only semi-annual or annual oil changes and bowl deposit removal.

PANELBATH FILTER—Built to up-grade panel filtration of intake air, the PANELBATH has low initial cost...replaces 2" and 4" oil-wetted or centrifugal panels on engine air intakes. Requires only periodic servicing at 90-day intervals under normal operating conditions.

Replaces panel filtration with resultant efficiency at least equal to that replaced.

The principle of the oil bath used in both these Air-Maze filters is backed by successful service on over 4000 locomotives.

For further information, contact your locomotive builder or write Air-Maze Corporation, Cleveland 28, Ohio.



*The biggest names in diesels
are protected by Air-Maze filters*

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The Filter Engineers

ENGINE AIR FILTERS • CAR BODY FILTERS • LUBE OIL FILTERS • OIL SEPARATORS • PASSENGER CAR FILTERS

LOCOMOTIVES AND CARS WHAT'S NEW IN EQUIPMENT



Welding and Chipping Goggle

A new goggle for welding and chipping has a frame of soft but durable and flame-resistant vinyl plastic. The material is very light in weight and conforms easily to the contours of the operator's face. The eye piece adapted is molded of more rigid plastic material, permitting both eye pieces to be raised as a unit without disturbing prescription glasses. A cover lens protects the 50-mm green filter lenses which can be had in shades 3 to 6 for welding use. Substituting the cover and filter lenses with hardened lenses adapts the goggles for chipping and grinding protection. *Air Reduction Sales Company, a division of Air Reduction Company, Dept. RLC, 150 East 42nd st., New York 17.*



Dry Chemical Fire Extinguishers

The new Ansul "D" model chemical fire extinguishers feature "fresh-fill" performance, including maximum fluidization, absolute gas tightness, and simpler operation. Four models comprise the line: 5-, 10-, 20-, and 30-lb capacities. They can be had in fire equipment red or in white for maximum visibility in any location. The U.L. ratings are 8, 16, 20 and 30 B:C, respectively. *Ansul Chemical Company, Dept. RLC, Marinette, Wis.*

Electrical Insulating Tape

Type PDG tape is a combination of polyester warp and fiber-glass yarn to which a silicone coating is calendered to one or

both sides. Elongation is 15 per cent; there is no abrasion between warp and filler threads, and conformability is said to be excellent. The relatively high tensile and elongation permits the tape to be snugly applied even on irregular contours. The absence of destructive friction between the polyester and the glass fibers under flexing and vibration prevents failure of the glass yarn.

The tape is supplied in .010 in. and over thickness. *Quaker Rubber Division, H. K. Porter Company, Dept. RLC, Tacony and Comly sts., Philadelphia 24.*



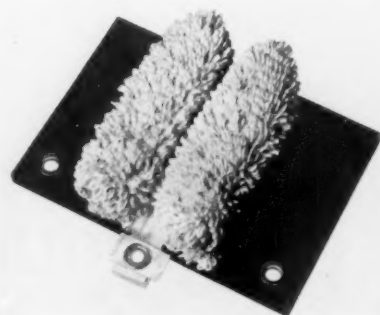
Self-Propelled Scaffolding

A self-propelled scaffolding on wheels, which can be moved while elevated, is said to save 25 per cent of a workman's time. It is propelled by a crank at the side of the guard rail. A steering handle permits forward or reverse movement, and a safety brake locks the unit in position while working. The scaffolding is of welded and bolted steel construction, and its wooden platform can be adjusted to one of seven positions up to 12 ft. high. It can be assembled or disassembled in less than 60 sec. *Castle Manufacturing, Inc., Dept. RLC, 1701 Glenwood, Flint, Mich.*

Journal Lubricator

The Premier journal lubricator has a wool felt base, twin foam-neoprene center cores, and cotton duck covering with chenille wicking loops, and is said to provide low journal operating temperature with low sensitivity to dirt.

The wool felt base serves as an oil reservoir, prevents damage to the lubricating pad,



and eliminates danger of "wick grabs" by the bearing.

A twin foam-neoprene design was selected so that positive journal contact could be achieved without excess pressures which cause elevated operating temperatures. Best wicking action, too, is said to be obtained in the center section between the neoprene cores.

Two strands of tufts clear the journal on each side. As a car starts to move, tufts from one side are drawn under the journal, immediately depositing a quantity of oil. *Premier Manufacturing Corporation, Dept. RLC, 107 Penn ave., Pittsburgh 21.*



High-Pressure Steam Cleaner

A fully automatic, heavy duty steam cleaner, for one-man operation in automotive, aircraft, railroad, and general industrial maintenance operations, has a cabinet of heavy-gauge metal protected both inside and out with a baked enamel finish. There are no dangling wires or outside openings. A rack is provided for the gun and hose.

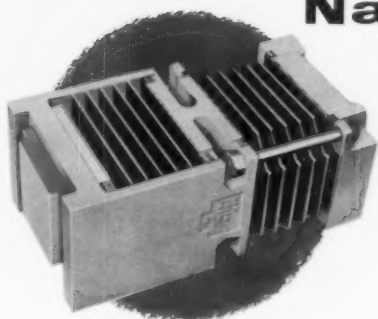
The cleaner is available in two capacities: Model 275-110 volts, 1½ hp; Model 360—220 volts, 3 hp. Both units have a fuel capacity of 15 gal and a soap capacity of 15 gal of concentrated solution. The soap regulator is clog-proof and easily regulated. *Circo Equipment Company, Dept. RLC, 51 Terminal ave., Clark, N.J.*

(Turn to page 14)

EQUIPMENT MODERNIZATION



Key to Successful Railroading



It is the 65,500 foot-pound cushioning capacity of National MF-400 Rubber Draft Gear that reduces center sill stress as much as 59%, thus giving greater protection to the car structure from damaging impacts.

National Rubber Draft Gears on the Southern Railway

National Rubber Draft Gears are used to provide a high degree of impact protection for freight cars on the Southern Railway System. In addition, the Southern's large Diesel road locomotives also use National Rubber Draft Gears to protect car and locomotive structures.

In fact, today there are more than 30,000 carsets of National Rubber Draft Gears in service on America's railroads — many with service records of over 8 years and hundreds of thousands of maintenance-free miles.

AA-7268

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Cleveland 6, Ohio

International Division Headquarters
Cleveland 6, Ohio

CANADIAN SUBSIDIARY: National Malleable & Steel Castings Company of Canada, Ltd., Toronto 1, Ontario

WHAT'S NEW IN EQUIPMENT—Continued from page 12



Tool Set

This 5232-GS-BB general purpose set of 232 tools is complete with chest, drawer section and Roll-Cab. It is for use in servicing and repairing machines, gas or diesel engines, cars and trucks, and material-handling equipment. The tool chest and drawer section are standard. However, another drawer arrangement can be selected if desired. A raised rim around the Roll-Cab top and corner retainers on the drawer section hold the three units in place. The set contains socket combination, ignition, tappet and hex-head wrenches; pliers; standard and Phillips screwdrivers; chisels and punches; "Torquometer"; soldering gun; hack saws; snips; wire brush; tape; hammers, and many specialized automotive tools. *Snap-On Tools Corporation, Dept. RLC, 8928 28th ave., Kenosha, Wis.*



Spring Pin Kit

The No. 300 Kit is a compartmented plastic box containing 700 carbon-steel Rollpins of various diameters, including $\frac{1}{16}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{5}{16}$, $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{3}{8}$ in. The individual pieces range in length from $\frac{3}{16}$ to $3\frac{1}{4}$ in. and include a "mix" believed to be most practical for machine shops, repair work, etc.

The Rollpin is a slotted, chamfered, tubular spring pin which can serve as a taper pin, straight pin, set screw, rivet, dowel, hinge pin, cotter pin, or stop pin. *Elastic Stop Nut Corporation of America, Dept. RLC, 2330 Vauxhall Road, Union, N. J.*

Lubricator Pad—A Correction

In the description of the new Magnus lubricator pad on page 12 on the November issue it was incorrectly stated that "Each pad is 6 in. by 11 in. and holds up to 5.9 pt of oil."

The pads are available in standard sizes for 5 x 9, $5\frac{1}{2}$ x 10, and 6 x 11 car journals, and each pad will hold more than 2.5 times its own weight in oil—better than 5.9 pts for the 6 x 11 size.

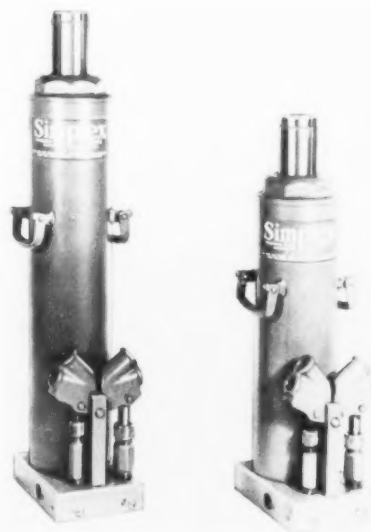


Air-Cooled Engine-Driven Welders

Three drooping voltage arc welders provide 115/230-volt, 10-kw, single-phase, 60-cycle power when operated as power plants. They have 115-volt, 1-kw d-c auxiliary power available for operating lights and power tools while welding. The 250-amp d-c machine is for general purpose construction and maintenance welding in the field. The 300-amp a-c/d-c machine is a remote area welder and power plant for a-c welding and d-c reverse or d-c straight polarity welding current. The 300-amp a-c/d-c Heliwelder is for field operations where aluminum or magnesium structural welding is involved. Automatic inert gas control panel with solenoid valve and post flow timer is standard equipment on the Heliwelder.

The machines are equipped with Hercules-Lycoming engines. Optional accessories in-

clude two-wheel road trailers, canvas covers, and a water-circulating system. *Air Reduction Sales Company, Dept. RLC, 150 East 42nd st., New York 17.*



Hydraulic Jacks

Two high-lift hydraulic jacks added to the Simplex line have a capacity rating of 25 tons and are equipped both with high- and low-speed pumps which may be operated singly or in unison. Model 25H28 has a closed height of 28 in., a 22-in. lift and weighs 125 lb. Model 25H22 has a closed height of 22 in., a 16-in. lift and weighs 105 lb.

Both models are designed to lift 50 per cent over their 25-ton rated capacity. They may be operated either in vertical or horizontal position and are equipped with double-lever sockets to permit operation in close quarters. *Templeton, Kenly & Co., Dept. RLC, Broadview, Ill.*

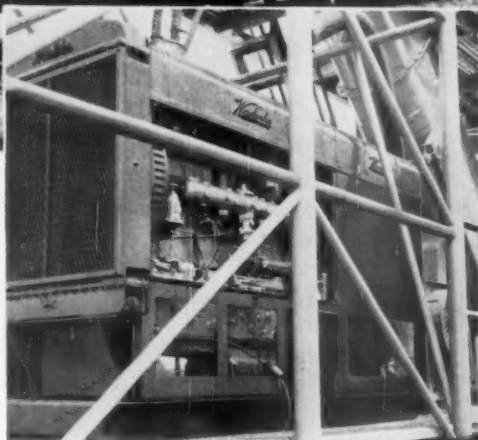
Mercury Lamp

A new 400-watt "Bonus Line" mercury lamp for street lighting and general industry is said to have a better maintained light output than any other discharge lamp, including the fluorescent. It will give 25 per cent more light than present 400-watt mercury lamps after one year, or about 4,000 hr of burning time; at the end of 8,000 hr, 65 per cent more light. It is completely interchangeable with the present 400-watt mercury and has a useful life in excess of 9,000 hr—3,000 more than the 400-watt mercury. *Large Lamp Dept., General Electric Company, Dept. RLC, Cleveland 12.*

(Turn to page 60)



WAUKESHA **ENGINATOR®** powers **Car Icing Machine Unit**



Moving on a track alongside refrigerated car trains... no icing platform needed... this mobile icing machine unit ices cars on either side. So flexible is its extending or retracting snout, that four hatches of adjacent ends of two cars can be iced from one position. With four men, a train is iced at two minutes per car.

This Waukesha-Enginator-powered mobile unit is speeding the icing of the Pacific Fruit Express Co. cars at Eugene, Oregon. Its head-end 4-wheel tractor carries the power plant and icing machinery; and the four 4-wheel trailers

haul a total of 60 tons of ice in 300 lb. blocks.

On the tractor is a Waukesha 100 KW Enginator (a gasoline engine operating at 1800 rpm direct-connected to a 240/480 AC 3-phase 60-cycle generator). It powers controls (in cab on snout), ice breaker and elevator delivering ice to snout, also chain elevator (through trailers) which feeds ice to breaker. Breaker makes coarse or fine ice, which is salted at the top platform. Waukesha Enginators for gas, gasoline or Diesel fuels are available in 50 to 800 KW capacities. Send for descriptive bulletins.

392

RAILWAY DIVISION WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN



1953-54
(Testing Period)
18,000
WHEELS
SHIPPED

1955
39,000
WHEELS
SHIPPED

1956
130,000
WHEELS
SHIPPED

*Along with the
Railroads...*

Picking up

Railroad progress is also spelled out
in terms of higher speeds . . . heavier cars . . .
carrying more lading more efficiently.

Griffin answered the *requirements*
for that progress with the EQS Steel Wheel.
And, the record of acceptance—
well over a half-million wheels shipped—
shows it was the *right* answer!

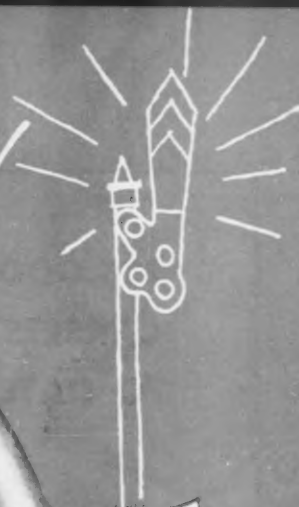


GRIFFIN EQS[®]
ELECTRIC QUALITY STEEL

GRIFFIN WHEEL COMPANY, 445 N. Sacramento Blvd., Chicago 12, Illinois

In Canada: Griffin Steel Foundries, Ltd., St. Hyacinthe, Quebec

Give the "green" to **GRIFFIN**
and watch your costs go down!



1957
199,000
WHEELS
SHIPPED
(Accepted as
AAR Standard)

1958
245,000
WHEELS
SHIPPED

Speed!

Congratulations to the

**Burlington
Route**

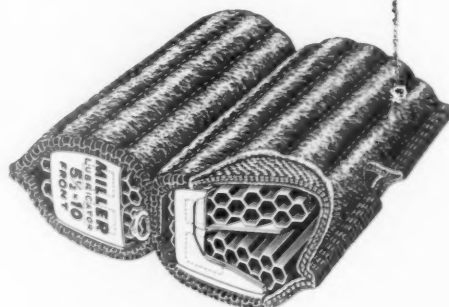
A friend and customer for
more than 70 years



235,000
CARSETS
TO DATE

FOR PROGRESSIVE RAILROADING

*Our sincerest thanks
and appreciation
to the Burlington Management
for its ever increasing use
of Miller center-feed
lubricating pads*



\$38 PER CARSET IN U.S.A.

10,000 CARSETS ALWAYS ON HAND—LIFE EXPECTANCY—6 YEARS
FIELD SERVICE IS AVAILABLE

MILLER LUBRICATOR CO., WINONA, MINN.

In Canada: Napanee Iron Works, Napanee, Ont. and Montreal, Que.

**Burlington
Route**

Special Report



1934



1935



1936



1936



1937



1942

In 1959 . . .

No 'Let Up' in CB&Q Equipment Maintenance

THE BURLINGTON . . . 8756 miles of railroad in the Mississippi and Missouri valleys between Chicago and the Rockies . . . a pioneer in streamlining and dieselization . . . a champion of passenger service . . . a pace-setter in freight car construction and maintenance. Here you have the story of the Burlington's mechanical department an organization which can face 1959 and its problems with the same ingenuity which has solved a whole series of revolutionary equipment and equipment maintenance problems during the past quarter century.

It was 1934 when the Burlington operated the first original stainless-steel Zephyr streamliner. A multitude of problems have been solved since those depression days: Equipment and equipment servicing for a revitalized passenger service; operation and maintenance of diesel road locomotives for passenger and then freight service; cars and power for huge wartime freight and passenger loads; systematic additions to the freight car fleet; the first dome cars; the first gallery coaches; and the first Slumbercoaches. Finally, the mechanical department has maintained effective control of costs during an inflationary period.

Today 4060 employees maintain and service 786 locomotive units 46,863 freight cars, 1064 passenger cars and 4807 non-revenue cars which comprise the rolling stock of one of the Midwest's most progressive railroads. Control of costs refinement of methods, and reliability of equipment operation are primary problems which confront the Burlington mechanical department in 1959.

HIGHLIGHTS OF A QUARTER CENTURY: 1934—First diesel-powered, stainless-steel, articulated, Zephyr streamliner goes into service; 1935—Freight car building programs are resumed; 1936—Burlington's first non-articulated, road-passenger diesel locomotive goes into service; 1936—First diesel shop is built at Chicago (view shows it still in use today); 1937—First diesel switching locomotives are acquired; 1942—First FT road locomotives begin handling freight trains; 1945—First dome cars are built; 1950—Suburban service is modernized with first high-capacity operation; 1956—First Slumbercoaches are placed in service; 1956—Gallery cars; 1953—Piggy-back service, begun in 1941, becomes major Latest vista-dome Zephyr goes into operation; 1958—Freight car building program continues at fast pace.



1945



1950



1953



1956



1956



1958

Goal of the Burlington's Mechanical Department . . .

'Doing Job Better Than It Has Been Done'

"IN PERFORMING its tasks of keeping the Burlington's rolling stock in good running condition, our mechanical department is guided by several basic ideas that underlie its activities," J. D. Rezner, mechanical assistant to the vice-president, explained. During this interview, the Burlington's chief mechanical officer went on to comment on his department's activities—present and future.

'Centralization . . .'

"One point that deserves emphasis is centralization. We have centralized our locomotive repair and maintenance at West Burlington, Iowa; our freight car building repair and maintenance at Havelock, Neb., and our passenger car repair and maintenance at Aurora, Ill. Centralization of our heavy repair work at these points has enabled us to use production-line techniques which we have found to be effective in avoiding high maintenance-cost-per-mile ratios.

'Flexibility . . .'

"At the same time we have introduced flexibility into our operations by locating facilities for light repairs at various points strategically situated around our system—Hannibal, St. Joseph, and Kansas City, Mo.; Denver, Colo. (the western end of our system); Chicago (our eastern terminus); Galesburg, Ill. (the hub of our lines East); Lincoln

(the hub of Lines West); Omaha, Neb. and St. Paul, Minn. for example.

'Stability . . .'

"Stability is another feature of our car building, maintenance and repair programs. By scheduling our activities at a relatively steady pace we avoid a "snowballing" of work that might overtax our manpower or facilities. A stabilized maintenance program helps us retain a constantly available skilled work force which is conducive to efficient and economical production.

"For more than 20 years we have been building a substantial part of our new freight cars of standard types. We have found that our Havelock Shops have been able to build new cars on a production line basis at less than the cost for which they could have been purchased from commercial car builders.

'Communication . . .'

"With our many widely separated facilities communications takes on special importance. We try to achieve a free flow of information between our Chicago headquarters and shops along the line, thereby keeping us advised about the condition of our locomotives and cars. Recommendations of local supervisory staffs concerning maintenance problems are studied carefully. Standardization of maintenance and

repair practices is achieved by prompt posting of all personnel on the latest available techniques.

'Improvements . . .'

"In our cyclical heavy repairs to freight cars we make improvements on them incorporating modern features in the rebuilt cars. In the testing of purchased materials and equipment involving metallurgical and chemical analyses our research laboratory at Aurora plays an important role.

'Look Forward . . .'

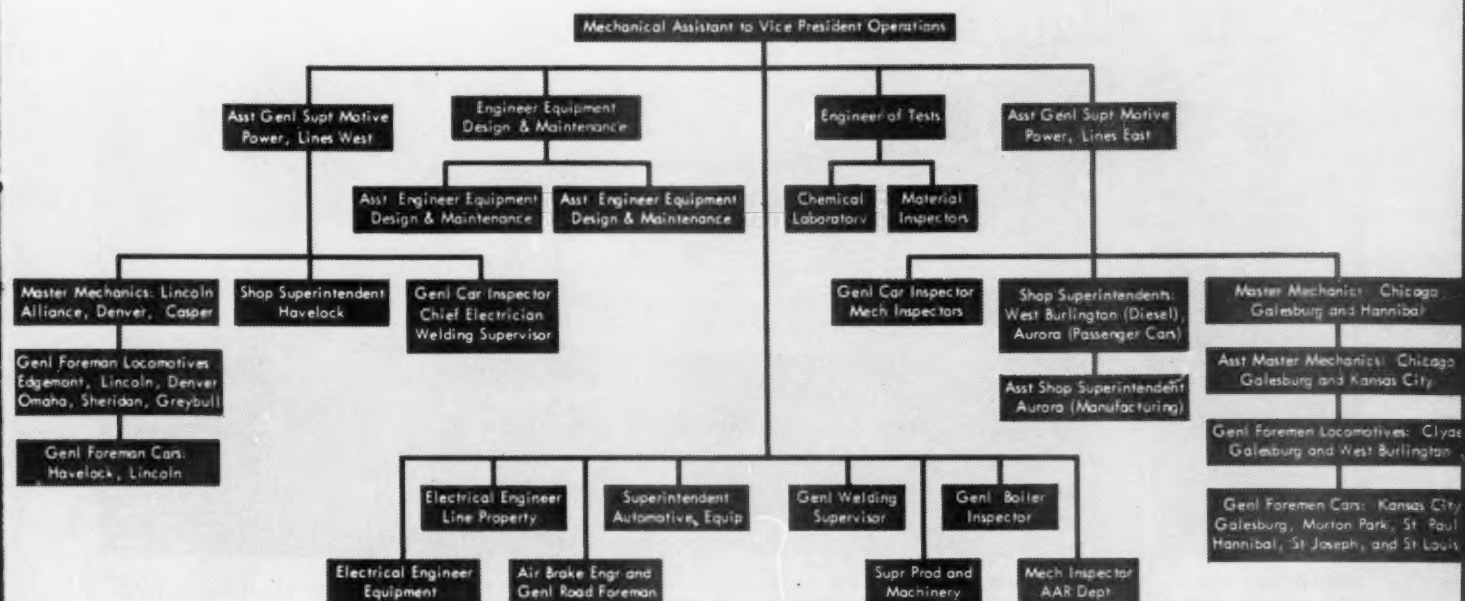
"We look forward to the day when all rolling stock will be equipped with roller bearings. The most bothersome problem facing railroads today is the hotbox. Aside from bearing performance there is still room for improvement in other component parts of rolling stock. For instance we need better shock-absorbing draft gears, sturdier bolsters and lighter and stronger metals for sheathing, ends and underframes.

"We believe that the best goal is doing the job better than it has been done in the past. Numerous studies have been made in the past and will continue to be made with a view toward improving our facilities. However, no expenditure is requested of management unless we are satisfied that substantial savings can be made."

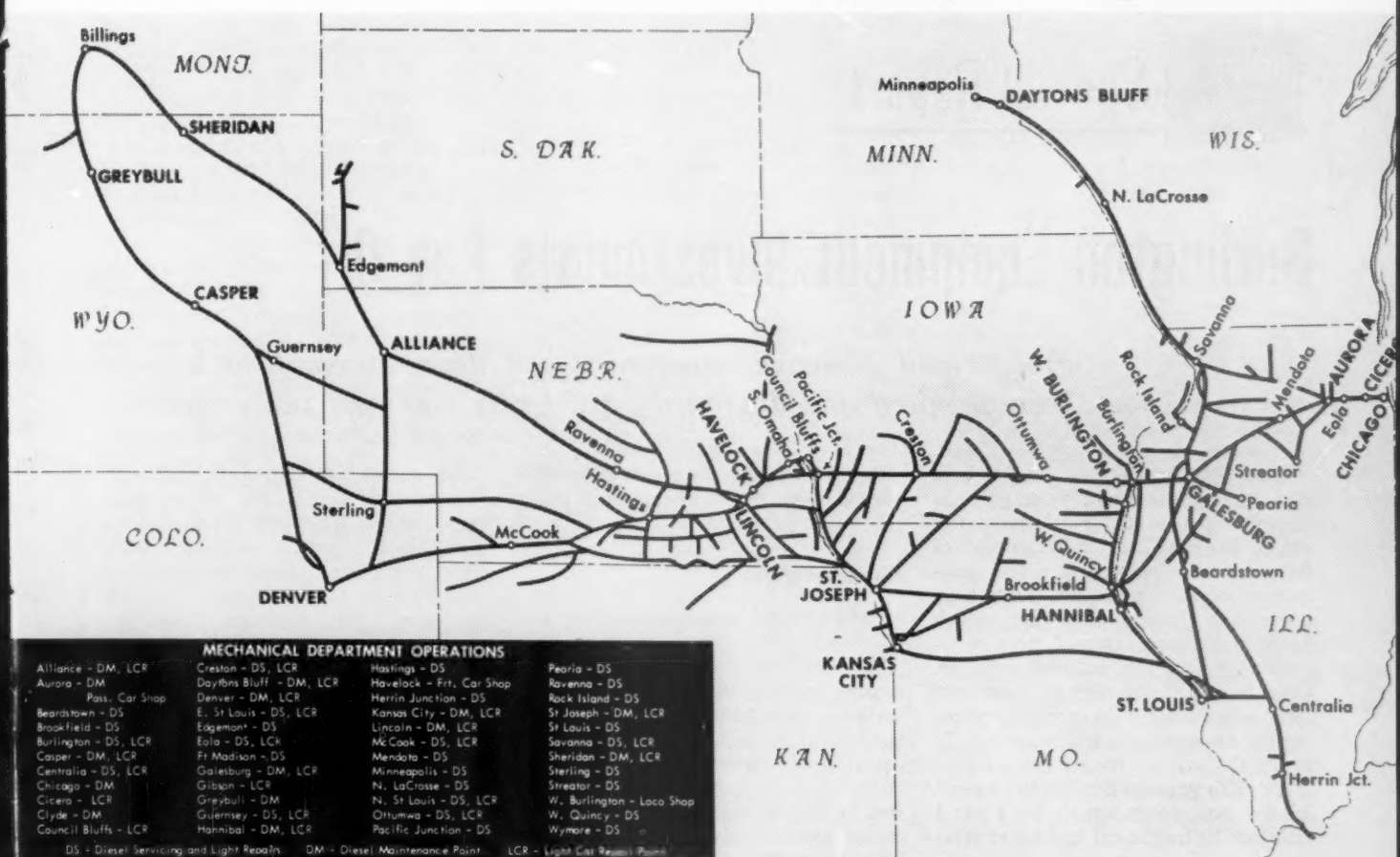
Burlington Has Controlled Its M of E Expenses

YEAR	MAINTENANCE of EQUIPMENT EXPENSES	RATIO OF MAINTENANCE EXPENDITURES TO OPERATING REVENUES					
		Locomotive Repairs		Car Repairs		All M/E Expenditures	
		Burlington	Class 1 RR's	Burlington	Class 1 RR's	Burlington	Class 1 RR's
1957	\$44,775,473	3.9	5.9	7.2	7.2	17.3	18.2
1956	42,790,642	3.7	4.6	7.1	7.2	16.6	17.9
1955	39,149,896	3.6	4.8	6.4	7.2	15.7	17.7
1954	43,180,519	3.8	5.1	7.4	7.2	17.1	18.5
1953	40,018,049	3.5	5.3	6.0	7.9	14.2	18.6
1952	40,839,794	3.5	5.7	6.7	7.5	15.1	18.5
1951	39,300,552	3.6	6.1	6.1	7.7	14.7	18.7

Burlington's Mechanical Organization . . .



. . . and Its Widely Dispersed Operations





Materials, design and maintenance have made it possible for each of the two original Denver Zephyr trains to operate 7,445,317 miles during the 22 years since their introduction on November 8, 1936. Today, these two trains operate as Texas Zephyrs, and the diesel units shown hauling the train in this 1936 view have been rebuilt with conventional elevated cabs. Stainless-steel cars, inspected during shopping in 1956, were found to be in "excellent" condition.

1936-1938



Special Report

Burlington Equipment Investments Pay Off

Freight and passenger equipment and diesel locomotives have been acquired and upgraded consistently over past two decades

THE BURLINGTON has bought, built and rebuilt freight and passenger cars consistently over the past twenty five years. Its new cars and locomotives have not been ordered in a few spectacular buying sprees but have been going into service at a rate which keeps the average ages of most of its rolling stock under national averages. Once acquired, Burlington cars and locomotives are kept in excellent operating condition at costs which are usually below the average for all Class I railroads. This year the Burlington's spending for cars repairs equals the Class I ratio but its freight car bad order ratio is only half as large. In short, the

Burlington frequently seems to be able to get more for its maintenance dollar than many another railroad.

Stainless Steel

Much of this stems from buying well to begin with. This is probably best illustrated by the 226 stainless-steel passenger cars, the majority of which make up most of the Burlington's crack trains—its Zephyr fleet. Over almost a quarter century, some of these cars have been demonstrating their ability to operate in high-mileage service with maximum availability. From a structural standpoint, these Budd-built cars have

been almost trouble-free. It is interesting to note that it was twenty years ago that the Burlington abandoned the articulated principle when purchasing new passenger trains. Stainless steel has been used as a car-body sheathing on many CB&Q passenger diesels and has proved as successful there as on the coaches. The Burlington usually specifies a copper-bearing steel for its freight car construction.

Equipment Designs

From the beginning of the "streamliner" era, the Burlington has been a real pioneer in developing or utilizing



1956-1958

Twenty per cent increase in revenue passengers has been recorded by two new Denver Zephyrs introduced October 28, 1956. Already these stainless-steel, vista-dome trains have operated 1,500,000 miles. H. C. Murphy, Burlington president, commented that "the impressive record of these trains offers additional evidence that fast, modern equipment and good service can attract an increased volume of passenger traffic to the railroads."

new rolling stock designs. After its experience with the earliest all-coach Zephyrs, the Burlington was then a leader in the evolution which brought about the luxury streamliner catering to all classes of rail travel. As soon as World War II ended and with the encouragement of General Motors the Burlington converted two of its light-weight coaches to produce the world's first dome cars. In 1956, the Burlington put into service the first Budd Slumber-coaches—a sleeping car of such high capacity that its room-type accommodations can be offered at basic coach fares. These cars have been operating at more than 80 per cent of capacity since their introduction and have not diverted traffic from higher rated Pullmans, but have generated new travel.

The introduction of the stainless-steel gallery coach in Burlington suburban service in 1950 was the major factor in the complete renovation of this operation. Today, 60 of these cars have established a pattern of comfort and high capacity in car design. All of the other 79 coaches used in the CB&Q suburban service have been completely rebuilt and air conditioned. Power cars are used to supply 64-bolt power for the lighting and air conditioning for all suburban trains. This makes it possible to use road passenger locomotives in the suburban pool and means that it is not necessary to have any specific loco-

motives assigned to the operation of a maximum of 66 commuter trains in the Chicago area on week days.

Locomotive Policies

While the Burlington operated the first General Motors two-cycle diesel in railroad service, and was an early

buyer of diesel switching and road passenger and freight locomotives, it is not completely dieselized even today. Steam locomotives have been relied upon to handle traffic peaks. This has meant that, until now, most diesels could be utilized to a maximum. During the past few months, several steam locomotives have been in service. Facilities for these steam locomotives have been retained at a number of points.

Even the construction of servicing and maintenance facilities for diesel locomotives have been handled most conservatively. At only a few points (Clyde, Lincoln, Galesburg and Denver) have complete new shops been built. Most of these have not been overly elaborate for the volume of work that is handled. At most other points, diesel locomotives are handled in portions of the original steam locomotive enginehouses which have been retained, or are serviced and lay over at outside facilities.

In the operation of these diesel locomotives, the Burlington has participated in few experiments. Its engines are all fueled with No. 2 Grade fuel oil. A straight mineral-base lubricating oil is used in all freight and passenger engines. This oil is changed at 48,000-mile intervals on the units in passenger service and at 40,000-mile intervals for units in freight service. There are no blotter tests or spectrographic examina-

LOCOMOTIVE FLEET

(October 1, 1958)

	Units owned	Average age (Years)
DIESEL ELECTRIC*		
Freight, A units	110	11.35
Freight, B units	87	11.57
Passenger, A units	103	8.77
Passenger, B units	1	18.00
Multiple purpose	205	4.25
Switching	177	12.75
Total diesel electric	683	9.25
Gas electric switching	1	26.00
STEAM		
Freight	62	34.56
Passenger	10	30.80
Freight or passenger	33	21.55
Total steam	106	30.10
Grand total	790	12.07

*All diesel locomotives are General Motors-built except for 30 1,000-hp Baldwin switchers, nine 1,000-hp Alco switchers, two 450-hp Midwest switchers, and five 360-hp General Electric switchers.

tions. Oil removed from crankcases is reclaimed by a Refinol plant at Clyde, Ill. and the volume is about 20,000 gal. per month. The reclaimed oil is then checked by the engineer of tests and it is reused on locomotives in any type of service.

Burlington diesels use chromate-treated cooling water. The water for steam generators is supplied from demineralizing installations at all of the terminals where passenger locomotives are serviced.

Freight Equipment

The Burlington has adopted new types of freight equipment with the same alacrity that it accepted or sponsored new passenger car designs. It was one of the early roads to conduct tests with light weight freight car construction materials such as aluminum and alloy steels. In 1941, the road converted its first flat cars for piggy-back service and has continuously operated equipment of this type for its subsidiary,

Burlington Truck Lines, since that time. Since 1953, piggybacking has become a large-scale operation.

Another subsidiary, Burlington Refrigerator Express, has 113 mechanical refrigerator cars in operation. The average age of the 2,303 refrigerator cars of the BRE fleet is under eleven years. Other new freight car designs which the Burlington has adopted soon after their development include bulkhead flat cars, Compartmentizer and DF box cars, General American Airslide" covered hoppers, and Pullman Standard "super jumbo" covered hoppers (Railway Locomotives and Cars, October 1958, p 24).

Cushion Underframes

The Burlington now operates 300 box cars with cushion underframes. All of these cars and many other box cars have been fitted with Compartmentizer and DF equipment. Ride Control trucks have been used on all new cars built since before World War II. All new cars are equipped with either one-wear or cast steel wheels.

Generally the Burlington mechanical department has not had to cope with wide fluctuations in maintenance of equipment appropriations, or radical changes in overall policy. At the same time, the type of equipment acquired and the way it has been maintained from year to year have not made it necessary to resort to crash programs for buying or repairs.



Insulated box cars built at Havelock this year are DF equipped. Refrigerator cars operated by subsidiary Burlington Refrigerator Express have usually been built in the BRE shops.



Fleet of welded baggage cars built at Havelock in 1954 have been painted and striped so their appearance will be compatible with the Zephyr trains in which they are operated.



Gallery cars were first built in 1950 by Budd for Burlington suburban operation. This type of car has since been adopted by the Chicago & North Western and Southern Pacific.

REVENUE CAR FLEET

(January 1, 1958)

Type of car	Average age—Years		
	Burlington owner-ship	Burlington ton	Class 1 railroads
INTERCHANGE FREIGHT CARS			
Box	24,019	15.47	17.85
Flat	2,384	14.13	21.24
Stock	3,434	27.91	31.36
Gondola	4,937	17.96	17.72
Hopper	7,905	15.94	20.34
Covered hopper	1,901	5.63	8.36
Refrigerator	2,303	10.30	25.46
All interchange freight cars	46,863	16.38	18.89

PASSENGER EQUIPMENT

Coach	292	23.30	28.72
Coach combination	53	32.06	32.73
Baggage, express	466	18.04	29.63
Sleeping	94	16.03	20.71
Parlor, Lounge	14	9.43	20.79
Dining	43	21.42	22.96
Postal	75	35.39	34.75
Other	25	41.56	39.96
All passenger equipment	1,062	21.78	28.49

Source — American Railway Car Institute



Five-unit diesel pulls out of Clyde shop on its way to pick up CD—Chicago to Denver fast freight. This is one of the most extensive Burlington shop installations. At most points, diesel shop and servicing facilities are much less elaborate than at this terminal just out of Chicago.

For Successful Locomotive Operation . . .

Scheduled Maintenance and Controls Assure Reliability

*Burlington diesels carry their own records with them
and this eliminates need for a central record office.*

SUCCESSFUL CONTROL of diesel repair costs, demonstrated by the 3.9 per cent of operating revenues expended on locomotive repairs in 1957, has been due largely to effective control of maintenance practices. Complete and novel record systems, standard procedures specified by a set of Diesel Maintenance Bulletins distributed to all maintenance terminals, and a thoroughly-developed preventive and progressive maintenance program characterize this control.

The preface to the Diesel Maintenance Bulletins spells out a primary aim of the Burlington's mechanical department: "The requirements for inspection and maintenance outlined in the CB&Q Diesel Maintenance Bulletins are primarily for the purpose of avoiding or minimizing road failures. This

policy is based on the concept of preventive and progressive maintenance so that locomotive difficulties will be foreseen and corrected before road failures occur."

Clyde (near Chicago) Lincoln Neb., and Denver are the main servicing and maintenance points for the road freight units. All three terminals have drop tables, and Lincoln has the only wheel truing machine on the railroad. Galesburg and Lincoln are also centers for extensive local freight operations. Locomotives are generally assigned to a

single terminal for federal inspections lubricating oil changes, truck work, engine component overhauls, and steam generator overhauls.

Since its installation, the Burlington has made extensive use of the Standard wheel truing machine at Lincoln. Need for wheel truing is based on inspection reports. Through cooperation with dispatchers, units are worked to Lincoln—usually making sure that this is done between "trip" and federal inspections. A wheel record card is carried on passenger locomotives to show where wheels were turned or applied.

Trip Inspections

"Trips" in Burlington parlance are the accumulation of specified mileages by road locomotives and form the in-



Special Report

Component Parts Records Are Carried on Locomotives...



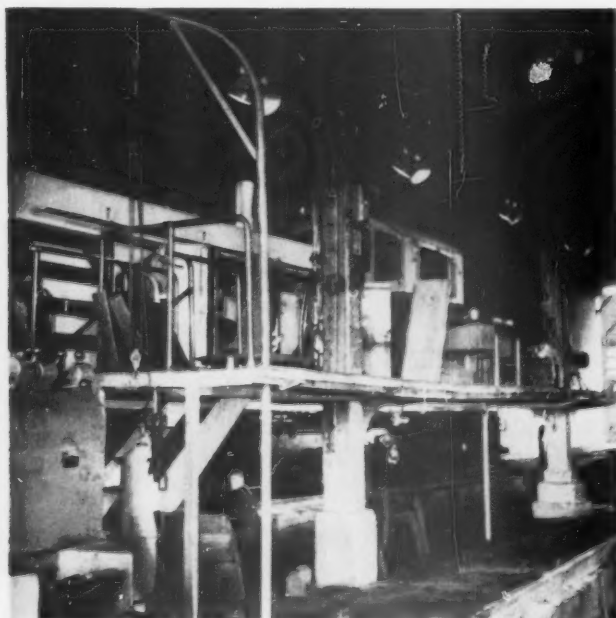
Card index box installed in the car body of each unit provides space for carrying crankcase lubrication record cards, traction motor record, and sets of record cards for all pistons, cylinder heads and cylinder liners on the unit. All of these are then immediately available when the need arises.

[illegible]

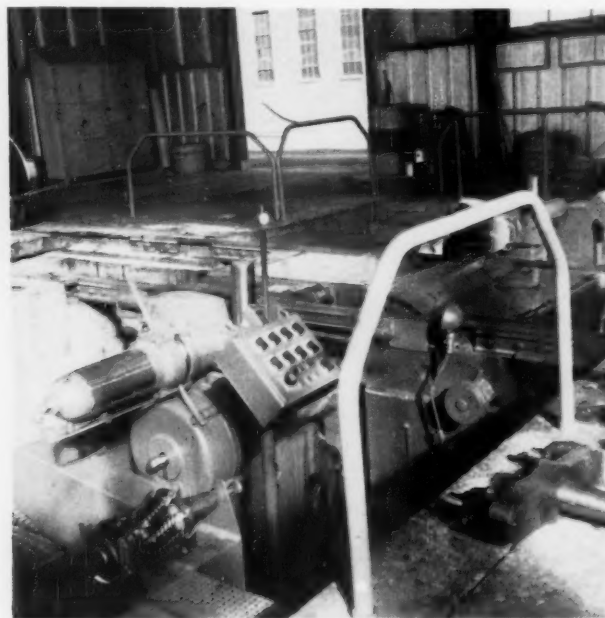
tervals which are followed by the scheduled maintenance work. Trip inspections are made on each road freight locomotive each time it has operated approximately one thousand miles and

on passenger units after each two thousand miles. Switchers are on scheduled 15-day or monthly maintenance cycles—or “trips,” at the discretion of local supervision.

The work performed at each of the scheduled inspections is completely specified and rigorously observed by the terminals. The individual jobs for any one inspection are dispersed through



Tri-level facility in one end of the roundhouse at Galesburg is used for work on diesel units serviced there.



Wheel work for road locomotives is handled on this Standard Wheel truing machine at Lincoln.

the units to minimize interference and speed the locomotive's dispatchment. Each component which requires inspection adjustment, or lubrication to assure its reliable operation is scheduled with sufficient frequency to produce this result. The functioning of the Burlington's preventive maintenance program is a variation of the "slide rule"

maintenance system. Instead of the actual slide rule, the Burlington uses its own system for controlling the preparation of work sheets for each unit when a locomotive arrives at a maintenance terminal.

The pooling of freight power frequently means that units do not return to the same terminal for each successive

"trip" inspection. Instead it is the job of each maintenance terminal, where such units may come for sanding and fueling between individual runs, to perform the proper maintenance cycle if the locomotive has accumulated sufficient mileage prior to its arrival there. The information comes from a log book
(Continued on page 29)

Typical DMB Specifies Diesel Storage Procedures

BURLINGTON LINES

Diesel Maintenance Bulletin—No. 20 Gen.
Chicago, May 20, 1958

All Diesel-Electric Locomotives

Subject: Procedure for Storage of Out-of-Service
Diesel-Electric Locomotives

1. CONDITIONS GOVERNING LOCOMOTIVE STORAGE:

1. Class of locomotive; 2. Length of storage time; 3. Points of storage; 4. Inside or outside storage; 5. Humidity; 6. Temperature changes.

Basically, all diesel locomotives will be given the same general preparation to cover a period of up to one year, if need be. The storage protection hereby afforded will cover all normally anticipated weather conditions regardless of inside or outside storage. The points of storage are to be left to the discretion of the master mechanic charged with the unit maintenance unless otherwise instructed.

2. ENGINE PREPARATION:

1. Drain engine cooling system; 2. Drain fuel oil heaters; 3. Remove water pump drain plugs; 4. Remove cylinder head plugs (201-A only); 5. Remove exhaust elbow plugs (201-A only); 6. Blow cooling system with compressed air; 7. All drain valves and necessary plugs are to remain open; 8. Drain lube oil system (engine temperature not to be less than 150 deg F at time of draining); 9. Remove lube oil filters and clean tank; 10. Open cylinder test valves; 11. Cover engine exhaust stacks with suitable water proof covers; 12. Fill engine governor to filler cap and plug sight glass vent with wood plug; 13. Tag in area of start button—"Engine water and oil are drained"; 14. Engine air filters to be removed and suitable blanking plates applied removed filters are to be stored in engine room and cleaned prior to putting unit into service).

It is felt that insufficient oxidation will occur in the cooling system to preclude the need and added expense for any special stabilizing oil or compound to be used. Water treatment residue should be sufficient. Gaskets and seals should not present too great a problem in a service-seasoned engine. Normal expansion will be resumed upon application of hot water to system prior to putting engine in ser-

vice. Drain valves left in open position will compensate for condensation due to humidity. Fuel oil filters are to be cleaned or renewed prior to putting engine into service. Lube oil retention of affected parts will afford adequate film protection until such time as the system is purged and charged with oil (warm preferably), prior to putting engine in service.

3. ELECTRICAL PREPARATION:

1. Main generator, add ¼ pint of MMG oil regardless of prior application date; 2. Auxiliary generator—no preparation; 3. Traction motors—no preparation; 4. Electrical cabinets—remove all fuses, open all circuit breakers, and pin reverser in neutral position; 5. Batteries—disconnect positive and negative leads (also center taps where used) and tape lugs; batteries are to be fully charged at time of storage, and specific gravity is to be maintained not less than 1,200 at all times.

Cleaning and blowing are not necessary upon storage. But, all electrical equipment will be blown, cleaned and inspected prior to putting unit into service. Brush tension is of no concern and brush spotting of commutators will be eliminated by periodic movement of equipment as outlined in Item 8. The prescribed equipment movement will also take care of lubrication needs of the electrical equipment. Battery freezing and excessive discharge will be avoided if handled as outlined.

4. CARBODY PREPARATION:

1. Seal all roof openings with waterproof Sisal Kraft paper and waterproof pressure sensitive tape; 2. Seal all carbody side air intake openings with waterproof Sisal Kraft paper and waterproof pressure sensitive tape; 3. All carbody air filters are to remain in proper location, but filters are to be cleaned prior to putting unit into service; 4. Empty sand boxes; 5. All doors are to be closed and securely fastened.

5. AIR SYSTEM PREPARATION:

1. Drain compressor lube oil crankcase and tag to indicate it has been drained (tag to be located in area of engine start button); 2. Insure that all water is drained from water cooled air compressors where used; 3. Drain all air lines, sumps, dirt collectors and reservoirs of condensate (drains to remain closed while in storage

to prevent entry of insects into air system); 4. Air hoses are to have dummy coupler carriers connected, or remove hose and insert pipe plug where dummy couplers are not provided (hoses are to be stored on the unit when removed).

There will be insufficient deterioration of air compressor diaphragms during storage to affect proper operation. Current inspection and maintenance practices will amply cover this item. Air compressor lubrication will be afforded under prescribed equipment movement.

6. STEAM GENERATOR PREPARATION:

Adhere to existing instructions for laying up various models of steam generators and boiler water supply systems.

7. MISCELLANEOUS PREPARATION:

1. Water coolers to be drained; 2. Toilet water tanks to be drained (where used); 3. Auxiliary engine water tanks to be drained (where used); 4. Remove water piping drain plugs of 4915 or standby heaters (where used); 5. Fill fuel oil supply tank to capacity (water to be drained from tank sump prior to putting unit into service). Fuel oil supply tanks should be filled to capacity upon storage to reduce atmospheric area and resultant condensation possibility.

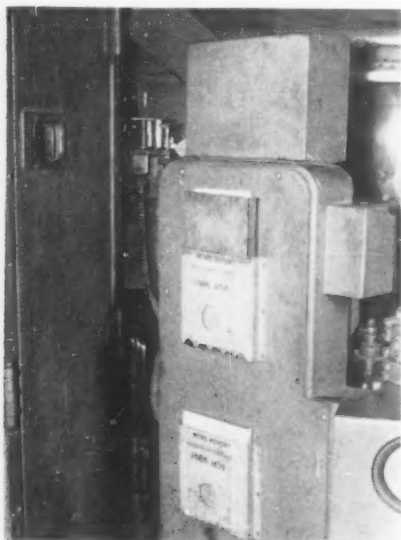
8. GENERAL:

1. Bar engine over at least one complete revolution once per week (engage cooling fan clutches where used); 2. Move stored locomotives at least once per week; 3. Examine condition of carbody opening covers and external doors at least once per week while in storage to insure original tightness.

If a locomotive has been stored for a period of one year (12 consecutive calendar months), it will be placed in running condition, started and power tested. If conditions are satisfactory, the locomotive will be given the above storage preparation for continued storage. Any defects noted during this inspection will be remedied prior to further storage.

Outlined equipment movement will properly protect lubricated parts, such as main bearings, connecting rod bearings, gears, pistons, liners, top deck assemblies, wheel journals, etc., from corrosive etching. This movement will also flex and reposition belt drives where used to prevent a detrimental "set" to occur.

How Scheduled Maintenance Operates . . .



Left: Log book in place in rack on back of SD unit control stand here, is carried on each cab unit. In it, supervisors and terminals report on unusual performance, specific repairs required, component parts changed out, and mileage accumulated by the locomotive.

Right: Data from log book and from maintenance record, along with schedule from proper routine maintenance cycle (in ring binder) provide data for making out the routine maintenance work sheets at the conclusion of each "trip".

Below: Current record of routine maintenance work is carried with log book. With data from this, the work sheets for the next "trip" are prepared. "Trips" are approximately 1,000 miles in freight service and 2,000 miles in passenger service.



Form 1721-M

PERFORMANCE RECORD FOR BATTERIES IN DIESEL LOCOMOTIVES

LOC. NO.	DATE NEW	APPLIED	REMOVED
BATT. NO.	DATE NEW	APPLIED	REMOVED
BATT. NO.	DATE NEW	APPLIED	REMOVED

DATE	INSPECTED AT	VOLTAGE		GRAVITY	FLUSHING AND SOLUTION HEIGHT	INSPECTOR
		LTS.	BATT.			
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REMARKS

Form 1721-A

MAINTENANCE RECORD DIESEL-ELECTRIC LOCOMOTIVES

LOC. NO.	TRIP NO.	PLACE	DATE	DEFERRED MAINTENANCE ITEMS
121	49	Chgo	10-24-58	
	50	Chgo	10-27-58	
	51	Chgo	10-31-58	
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BURLINGTON LINES DIESEL ROUTINE MAINTENANCE

TRIP No. 52

UNITS	ITEM	
X	1	OIL CHANGE MILEAGE.
AB	2	Frt — 40,000
CD	4	Psgr — 48,000
A	5	
AB	8	
X	9	
X	12	
X	13	MILEAGE FOR LUBR OF TRACTION MOTOR ARMATURE BEARINGS.
X	14	
X	16	
X	17	FRT & PSGR.
X	19	Oil — 10,000
		Grease — 16,000
A	21	
X	24	
AB	26	
X	36	
X	38	Check Date For Following Inspections:
X	39	Monthly
X	48	Quarterly
X	50	Semi-Annual
C	51	Annual
C	53	
C	59	
X	60	
X	61	
X	62	
X	64	
D	67	LEGEND:
X	73	Freight:
X	75	X—All Units
X	77	A—A-Unit
X	78	B—B-Unit
X	79	C—C-Unit
X	80	D—D-Unit
X	81	Passenger:
X	84	Both Engines if
X	86	"X" or "A" appears.
X	93	Other Letters Can Be Disregarded.
		Switchers:
		X—All Engines
		①—Single Element Filters
		②—Double Element Filters
		③—Quad Element Filters

which each cab unit carries and in which is recorded odometer readings or a listing of the terminals from which each dispatchment has been made. For freight power, the maintenance points are Clyde, Galesburg and Lincoln, along with St. Joseph, Mo.; Alliance, Neb.; Greybull Casper and Sheridan, Wyo.; and 23rd Street, Denver.

Maintenance Bulletins

Diesel Maintenance Bulletins not only spell out the responsibility for performing each type of work and indicating exactly what components are to receive attention, but they also have been worked out to include a whole series of standard practices. One of the most recent additions to this manual was the instructions for storing out-of-service locomotives (see box). Such instructions are prepared by a committee, at least in part on the basis of a series

of conferences with supervisors over the entire railroad familiar with the problems involved in the matter under consideration.

These bulletins are not reprints of manufacturers' instruction and data sheets but in every case have been individually tailored for Burlington locomotives and worked out to fit any peculiarities of Burlington operations. The first Diesel Maintenance Bulletin was issued in 1945 and since then they have been expanded to encompass today's 19 General Bulletins, 23 Mechanical Bulletins, 13 Electrical Bulletins, and 5 Boiler Bulletins. Examples of the variety of subjects include Power Truck Overhaul (General), Application and Storage of V Belts (Mechanical), Transition Indicators and Brake Warning Relays (Electrical), and Maintenance of Type 4915 Water Heaters (Boiler).

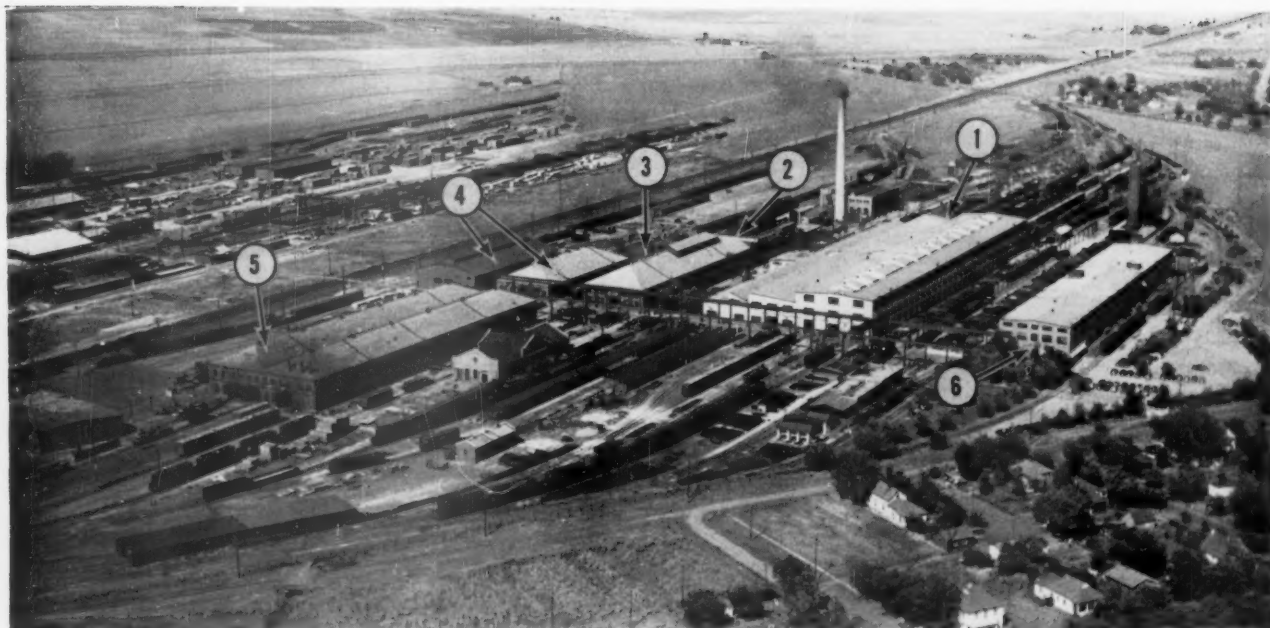
As one Burlington officer put it the Diesel Maintenance Bulletins are the

"key" to all locomotive maintenance. Supervisors are generally not permitted to deviate from the standard procedures except in extraordinary cases. It is a mechanical department instruction that only if the DMB does not cover a topic then the manufacturer's hand book is to be followed. This is the case because the Burlington has found that its operations permit deviations from standards set up by the manufacturers of equipment involved.

Road failures are rigorously studied on the basis of complete reports which must be filed in conjunction with almost every one. All efforts are then made to alter equipment or change maintenance practices to prevent additional delays of the same type. In this the Burlington has been successful. In fact, this diesel pioneer has been obtaining good and economical results from every phase of its locomotive maintenance.

Form 1721-B Sheet 1 Rev. D		ROUTINE MAINTENANCE WORK SHEET - ROAD DIESELS			
LOCATION <u>CLYDE</u>		DATE <u>11-3-58</u>	PED. INSP. DUE <u>None</u>		
LOCO. NO. <u>121</u>		TRIP NO. <u>52</u>	MILEAGE READING <u>76853</u>		
	A	B	C	D	MAINTENANCE ITEMS
1	X	X	X	X	1 Inspect cylinder head mechanism while idling
2	X	X			2 Inspect pistons, liners & crank case
3					3 Blow out & drain air box sump
4			X	X	4 Change engine air filters
5	X				5 Clean engine room filters & main generator filters
6					6 Clean sintered bronze & change fuel suction filters
7					7 Change Nugent or Full-Flo filters
8	X	X			8 Drain condensate from fuel filters & tank surps
9	X	X	X	X	9 Check operation of emergency fuel cut-off & reset mechanism
10					10 Change lubricating oil filters - DO NOT DEPER
11					11 Remove & clean lubricating oil suction strainers
12	X	X	X	X	12 Check operation of P&M engine protectors where used
13	X	X	X	X	13 Check lube oil level & for signs of dilution
14					14 Lubr. speed recorder drive with approved lubricant - Item 42, DME-18 GEN.
15					15 Make detailed inspection of all "V" belt drives
16	X	X	X	X	16 Check operation & condition of fan clutches (FT's)
17	X	X	X	X	17 Check oil level in fan drive gear boxes (FT's)
18					18 Change oil & flush traction motor blower, and inspect chain drives
19	X	X	X	X	19 Check cooling system; hoses, gauges, radiators & treatment
20					20
21	X				21 Remove & clean engine radiator screens (FT's)
22					22 Blow out radiator fins
23					23 Clean oil tank breather & crank case breather
24	X	X	X	X	24 Make visual inspection of pressure and temperature gauges
25					25 Fill engine water pump oil cups
26	X	X			26 Lubr. & inspect all jackshafts, idler & cooling fan bearings
27					27 Lubr. clutch pins, rollers and throw-out bearings (FT's)
28					28 Lubr. traction motor blower fans and check vibration
29					29 Lubr. coupler carrier
30					30 Torque Head & Crab Nuts #1 & #2 Style Assy.; Crab Nuts Only on #3 Style.
31					31 Change engine governor oil
32					32 Lubr. P&M couplings & tightup bolts - MURPAI #3 grease
33					33 Lubr. & inspect layshaft & shutter linkages
34					34 Check operation of lube oil pressure & suction switches
35					35 Lubr. & inspect electro-pneumatic governor control linkages
36	X	X	X	X	36 Clean & finish cooling system when sight glass shows rust, dirt or oil

Work sheet specifies the 96 items which are covered under the scheduled maintenance program. It is marked for jobs to be performed on individual units for each specific trip inspection. Information is taken from proper Maintenance Routine (facing page), and individual jobs are signed by workmen when completed.



Three-hundred acre plant at Havelock, Neb., includes (1) car shop which builds most of Burlington's new freight cars and makes heavy repairs to older cars. Other buildings important to car production include (2) blacksmith shop, (3) track scale, (4) lumber storage, (5) paint shop and (6) storehouse and office. Lumber processing plant is across the main line at upper left.

Along With Repair Programs...

Burlington Builds Its Own Freight Cars

Havelock shop has turned out new cars every year since 1936; mill gondolas and DF box cars will be next off these production lines

THE LOW AVERAGE AGE of the Burlington freight car fleet and the excellent condition of most of these cars largely reflects the steady activity of the road's freight car shop at Havelock Neb., a few miles east of Lincoln. Nationally in recent years an increasing proportion of new freight cars are being built by individual railroads at their own car shops. Such new car construction is a field where the Burlington has vast experience.

Building programs at Havelock every year since 1936 and at Galesburg, Ill. until operation of the Steel Car Plant there ceased in 1941, have produced

most of the present Burlington freight car fleet. In the past 21 years Havelock has turned out 33,720 new cars. These have been of almost all types. The shop has just completed the building of 350 covered hoppers. Even in a year when there have been reduced carloadings, the Burlington had turned out 1943 new cars at Havelock by November 1. By the end of December, this year's production will have included standard insulated and DF box cars; the covered hoppers; and 65-ft mill gondolas.

Burlington car building reached its peak in 1953 when 3,401 cars were turned out at Havelock. Despite its car

building experience and facilities, the Burlington has frequently turned to car builders for some of its new freight equipment.

General American has built Airslide covered hoppers for the Burlington. Only a few months ago, Pullman Standard turned out the first 100 of its new "super jumbo" standardized PS-2 covered hoppers for CB&Q grain service. These were the first such cars to be built with a capacity of 3,219 cu ft. At the same time, Havelock was producing 350 covered hoppers of more conventional size and design. Building programs for 1959 have not been announced.



**LENGTHEN ENGINE LIFE,
REDUCE MAINTENANCE**

Esso Airfil Coating Oil adds outstanding dirt pick-up properties to diesel air intake filters.

Airfil protection is so effective that it pays off handsomely in reduced abrasive wear, lowered repair costs, longer engine life. ¶ Airfil also shows superior wicking qualities. Successive layers of dirt and dust are quickly wetted, exposing a fresh, efficient dirt-retaining surface at all times. ¶ Applying Airfil is simple. It goes on rapidly as a hot liquid and cools to a gel-like solid that retains its consistency at engine-room temperatures. And since Airfil is insoluble in water, it stays on the filters, even in the wettest weather.

It can, however, be readily removed by a hot detergent wash or a steam blast.

Airfil's cost-cutting advantages make it ideal for passenger car air-conditioner filters too. For further information or technical assistance, call your local Esso office, or

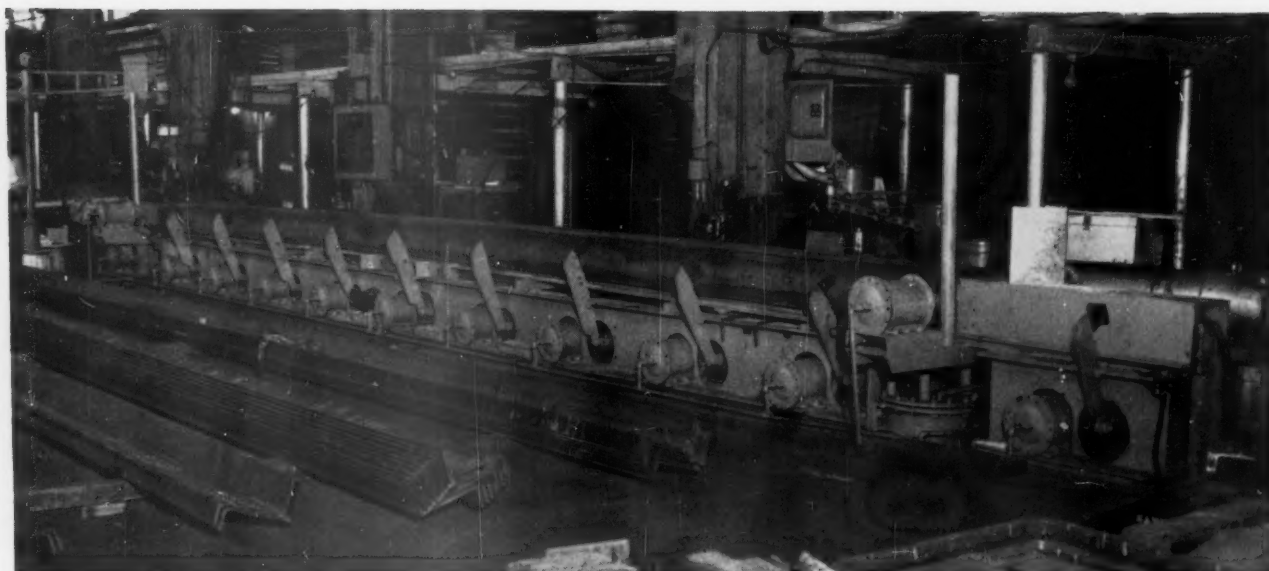
contact: Esso Standard Oil Co., Railroad Sales Division, 15 W. 51st St., New York 19, N.Y.

perfected by research...proved in performance

AIRFIL[®]



RAILROAD PRODUCTS



Air-operated cambering device is used on all center sills over 40 ft in length.

Havelock has also built streamlined baggage cars. Most roads turn to car builders for such passenger equipment.

Repair Programs

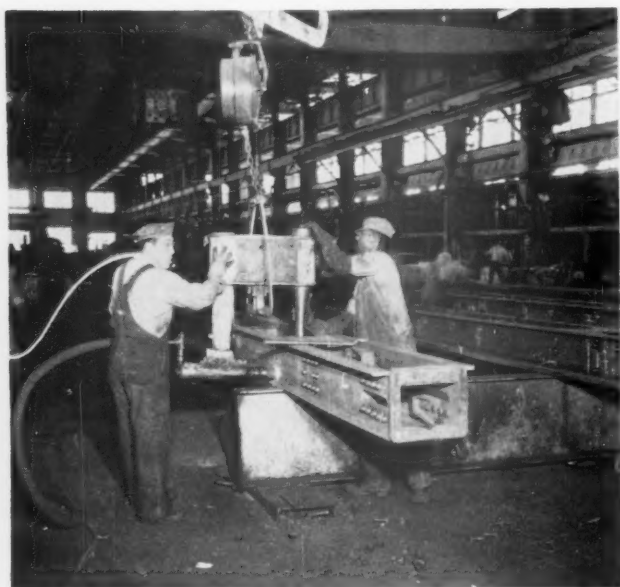
With all this emphasis on new car building it should not be assumed that the shop has been ignoring the existing car fleet. Three tracks run through the main car shop, a building 216 ft wide and 603 ft long. Any one of these three tracks can be utilized for either

heavy repairs or new construction. The order for 350 new covered hoppers just completed, came off the No. 2 track production line at the rate of six per day. On a second line, 500 gondolas (built in 1936 and 1937) have been receiving heavy repairs at the rate of five per day. These composite gondolas generally need end sills cover plates new flooring, and new side planks. The third track at Havelock has been making repairs to 100 cabooses.

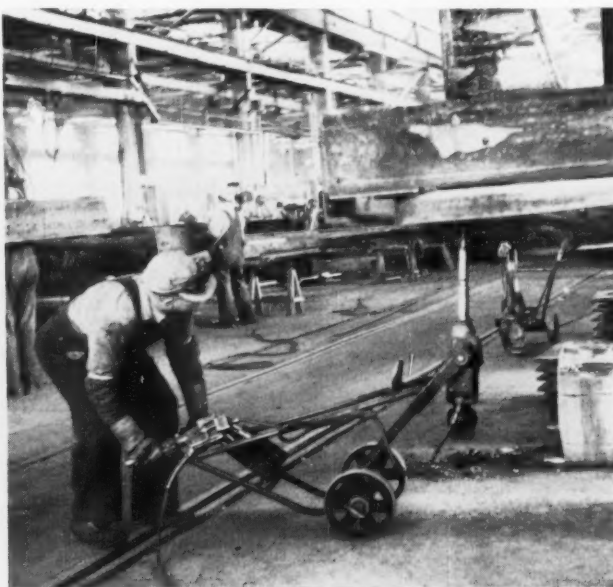
Cars of the same series are sched-

uled in lots for program repairs through a specially tooled repair line. Inspections and records over the years disclose defects that are common to each type of car. Generally, two or three individual cars are stripped down completely to determine the extent of repairs and changes needed. On this basis, a bill of material and shopping program are prepared to cover the entire series.

Heavy repairs are classified as those requiring more than 20 manhours per



Pneumatic riveter is used in fabricating bay where underframes are built up.



Portable reamer is used during assembly of covered hopper underframes.

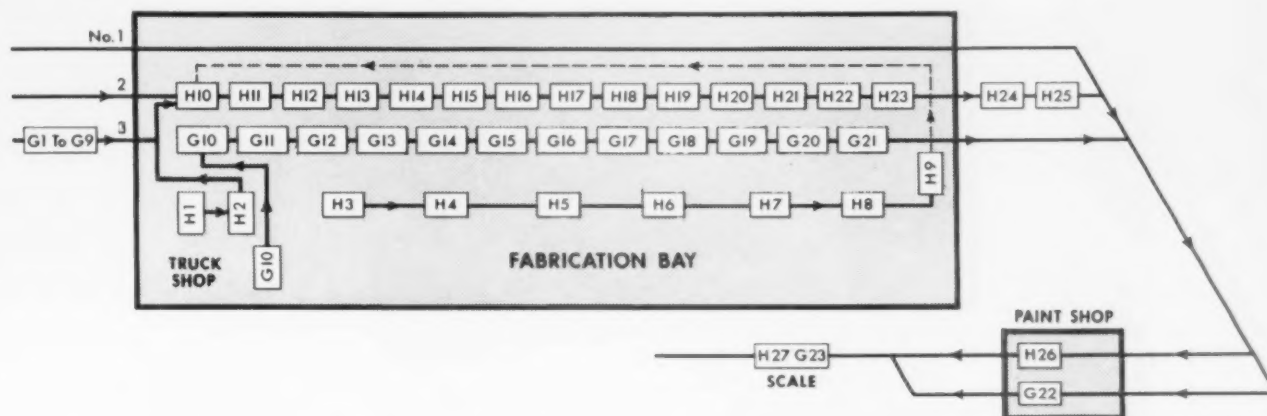
car. It has been the Burlington's experience that new cars produced by the shop will be due for their first heavy repairs about as follows: Box cars—7 to 10 years; hopper cars—12

to 14 years; composite gondolas—6 to 8 years for wood components and 12 to 14 years for steel parts; steel gondolas—12 years; and flat cars—10 years. After these first heavy repairs

have been made cars are then considered to be serviceable for seven years or longer—time varying with the type of car.

(Continued on Page 36)

How Havelock Production Lines Have Been Arranged...



Production runs just ending at Havelock have been turning out new covered hopper cars and repairing composite gondolas. These lines used two of the three shop tracks. The other track is being used for caboose repairs. Tracks are assigned for various operations as the need arises.

New Covered Hopper Assembly Line Six Cars per Day

- H 1—Wheels bored, axles turned, and wheels mounted in wheel shop.
- H 2—Trucks assembled and equipped with lubricator pads.
- H 3—Center sills, side sills, top side plates punched on spacing machine.
- H 4—Two channels, bolted back to back, punched for covered hoppers.
- H 5—Center sill assembly including installation of stiffener angles from bolsters out to ends; strikers, center fillers, and separators fitted in and riveted.
- H 6—AB brake valve installed. Bolsters put in place along with slope sheet connections to underframe.
- H 7—All holes reamed.
- H 8—Riveting completed.
- H 9—Frame placed on dolly in cross track for movement to H10 position.
- H10—Frame placed on trucks, slope sheets, hopper sheets, hood sheets, center partitions and center partition braces applied. Braces are riveted. (Additional frames are available outside at both ends of shop to keep line in production in case of power failure in fabrication section.)
- H11—Sides, end posts, outside hopper sheets, and safety appliances bolted in place. Stiffeners are welded on the sides.
- H12—Hatches and center roof sheets bolted in place.
- H13—Discharge door castings applied and welded.
- H14—All holes on sides, ends and safety appliances reamed.
- H15—Hopper sheets placed in position and bolted in place.
- H16—Hopper sheets and discharge valves are welded.
- H17—Sides, safety appliances; and center partitions are riveted.
- H18—Slope sheets are welded.
- H19—All brake equipment applied.
- H20—Hatches and roof welded.
- H21—Roof rivet holes at side plates and ends reamed along with seam caps.
- H22—Safety appliances and roof riveted.

- H23—Air brakes and discharge valves tested. End roof sheets and running boards applied.
- H24—Visual inspection inside and necessary welding to seal leaks.
- H25—Water test for leaks in welds.
- H26—Painting.
- H27—Weighing and stencilling.

Composite Gondola Repair Line Five Cars per Day

- G 1—Siding and safety appliances removed where necessary.
- G 2—Flooring removed including doors. Doors may be salvaged.
- G 3—End sills, top cover plates, posts, and diagonal braces removed where necessary.
- G 4—Rivet buster or torch used to remove all rivets from old steel framing. All loose rivets removed.
- G 5—Draft gears and yokes dropped and placed on truck for installation after inspection. Paint steel framing with red lead.
- G 6—Necessary new steel parts placed in car by crane.
- G 7—New steel parts installed and fastened with fit-up bolts.

- G 8—Top chords straightened if necessary.
- G 9—All holes reamed for rivets.
- G10—Car is jacked; trucks are removed for overhaul and replacement; and reconditioned trucks applied. Draft gears installed with yokes and fillers. All rivets are renewed at draft sills.
- G11—All new steel components riveted, including coverplates on center sill and cross bearers.
- G12—New flooring fitted and bolt holes drilled.
- G13—Floors bolted and door openings covered with temporary plywood.
- G14—Necessary siding and end lining placed on floor of car by crane.
- G15—Siding and end lining put in place and tacked with temporary nails.
- G16—Air brake equipment removed, cleaned, and tested.
- G17—Siding, end lining and safety appliances bolted. New piping installed, if necessary.
- G18—Air brakes tested.
- G19—Drop doors applied and all necessary welding completed.
- G20—Final inspection.
- G21—Inspection defects corrected.
- G22—Painting.
- G23—Weighing and stencilling.



Cast Steel INCORPORATED DROP END UNITS

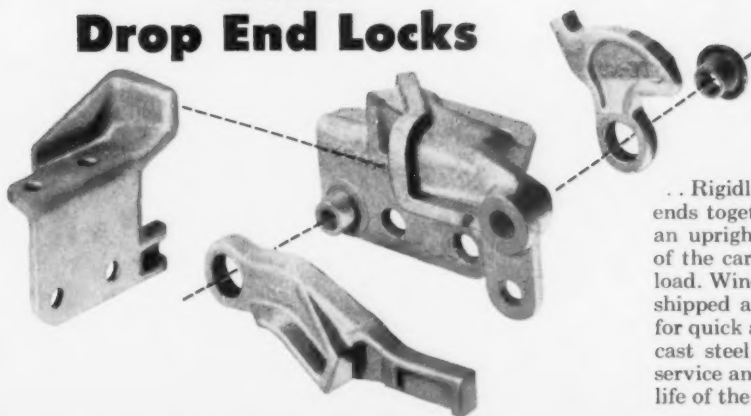
Speed



Service.. Sustain Structure

For outstanding economies . . . increased safety factors . . . improved strength and durability for the life of the car—Wine Drop End Units (Locks and Balancers) form *the perfect combination!*

WINE Drop End Locks



. . . Rigidly interlock gondola sides and ends together—securing the ends in an upright position. Top corners of the car cannot spread regardless of load. Wine Drop End Locks are shipped as an assembled unit, ready for quick application. Made of electric cast steel, they insure maximum service and durability throughout the life of the car.

WINE End Balancers

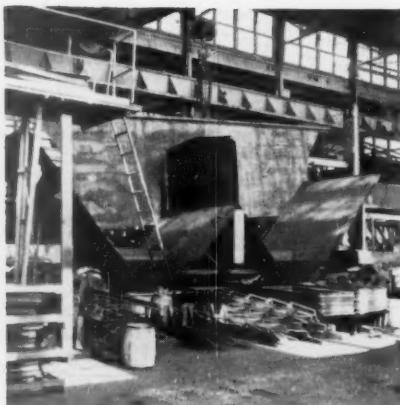
. . . Eliminate the necessity of using *four or five men* to close a drop end for car loading! Multiple spring steel torsion bars, incorporated between the center casting and the two outer hinge trunnion castings, permit *one man* to readily close the heaviest drop ends without assistance. Available for easy application on most drop end gondolas.

The word "WINE" in a large, bold, sans-serif font. Below the letters, a small illustration of a gondola car is shown, with the word "WINE" repeated on its side.

THE WINE RAILWAY
APPLIANCE COMPANY
TOLEDO 9, OHIO



Submerged-arc welder is used for application of side stakes to side sheets in jig.



Completed side is lowered into position after floors and partition have been placed.



Electric-resistance type rivet heaters are used at many points through the shop.

(Continued from Page 33)

Materials for new and repair programs are under the jurisdiction of the stores department at Havelock. Car production goes on during the first shift, and the entire line is stocked during the second shift for the next day's work. The blacksmith and fabricating shops turn out many parts, but the Burlington makes extensive use of fabricated assemblies such as car sides.

New car programs completed this year include 1,500 standard 40-ft 6-in. box cars, 25 DF box cars 100 insulated DF-RBL box cars, and 350 covered hoppers. The line has now been set up to build the fifty 65-ft mill gondolas. Shortly the last program for 1958 will get under way. This will

call for the building of 100 DF cars.

All new and program repair cars turned out this year have been equipped with lubricator pads, complying with AAR requirements. A system-wide lubricator application program is under way. Havelock is the system reclamation plant for these lubricator pads. The Railway Service and Supply Co. operates the Havelock plant, using the same equipment formerly used for renovating waste. The process is said to be quite satisfactory with all renovated pads meeting the present AAR requirements.

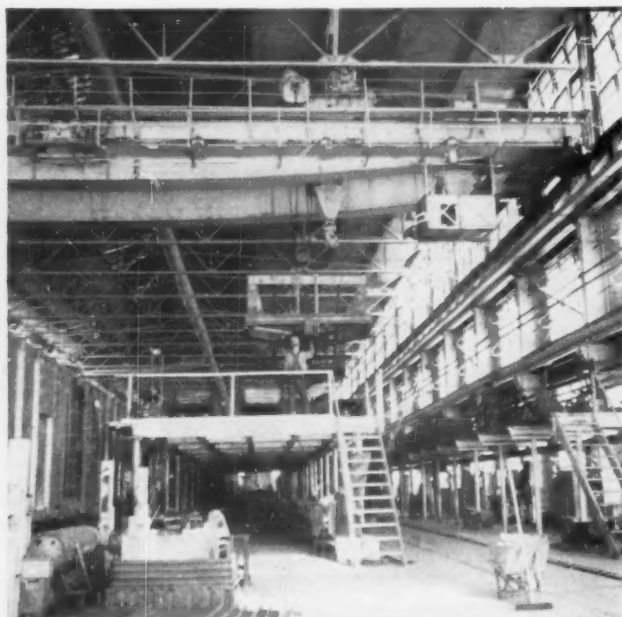
Modern machines and equipment, along with many time-saving devices make it possible for both new and repairs cars to move out of Havelock car shop with clock-like regularity.

**BURLINGTON
BAD ORDER RATIO**
Ratio of Bad Order Freight Cars
to Total Ownership (%)

	Burlington	Class 1 Railroads
1955	3.2	6.0
1956	3.6	4.2
1957	3.3	4.6
1958*	3.4	6.1

* - Ten Months

New car construction programs, systematic retirements and consistent repair programs have resulted in a freight car bad order ratio which is usually better than the national figure.



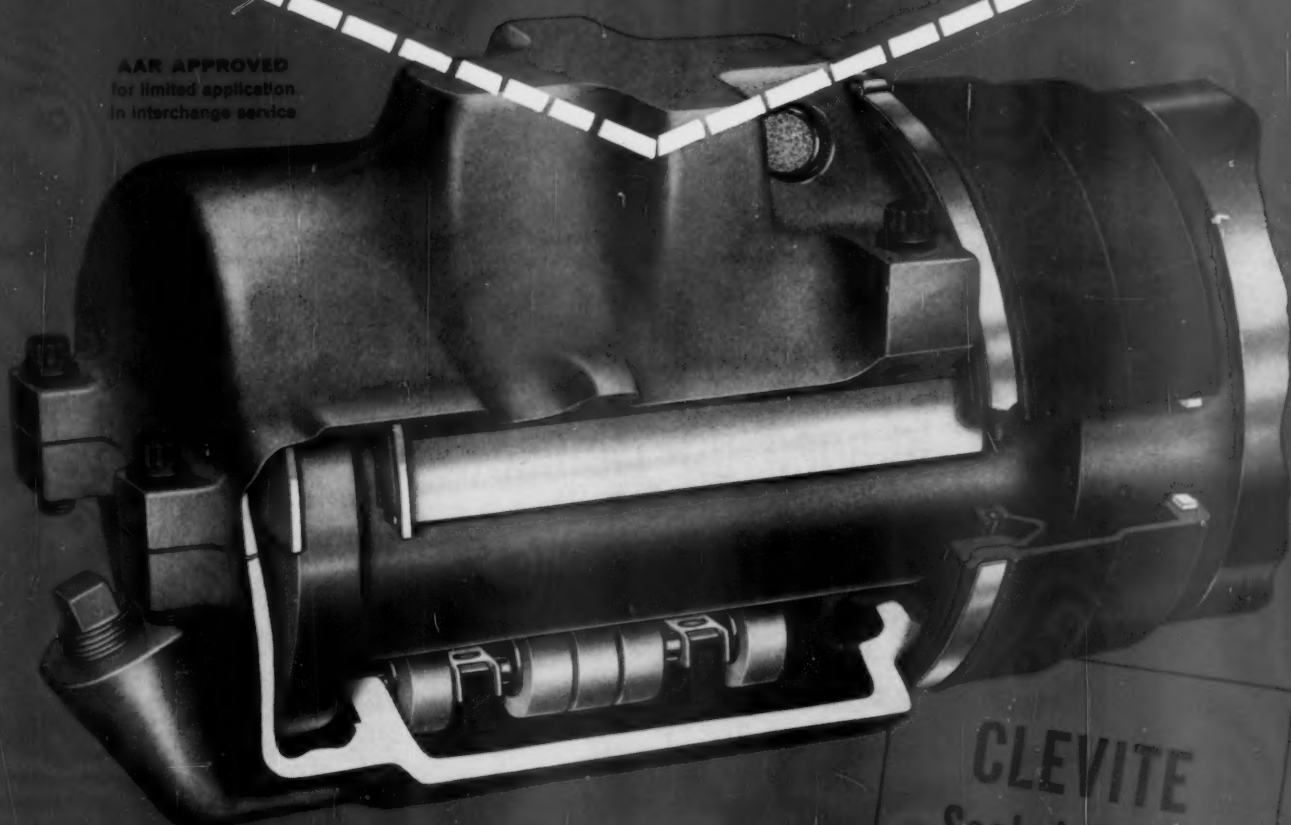
Platform between production lines simplifies work on car roofs and upper sides. Materials can be handled by overhead cranes.



Materials are stocked close to points of application. Here they are on elevated platform. Production lines are completely restocked on second shift.

KEEP YOUR EYE ON CLEVITE

AAR APPROVED
for limited application
in interchange service



WHAT TESTS SHOW In continuing road and laboratory tests, under the hardest service and simulated operating conditions, the performance of Clevite Cartridges has far exceeded all expectations.

Also experience from the growing number of applications shows that Clevite Cartridges require less modification of equipment, are installed at lower cost than any other comparable conversion.

WATCH FOR MORE TEST RESULTS!

CLEVITE Sealed Sleeve Bearing Cartridge

...new, permanent, soundly
engineered and economical
journal bearing conversion
for freight cars.

DISTRIBUTED BY:
**STANDARD CAR TRUCK
COMPANY**

The CLEVITE Bearing Cartridge is a development of Cleveland Graphite Bronze division of Clevite Corporation

322 S. Michigan Ave., Chicago 4, Illinois. In Canada: Consolidated Equipment Co., Ltd., Montreal 2, Quebec



With Burlington's Intensive Utilization . . .

Diesels Are Shopped on Time Basis

*West Burlington gave general repairs to 184 units
last year and has matched this pace in 1958*

GENERAL REPAIRS to Burlington locomotives are made on mileage and time basis. Actually variations in the time cycles for shopping do represent locomotive mileages and load factors. Utilization is high on all units and efforts are made to assure that individual units of each class do about the same work. This equalization is frequently achieved by swinging locomotives in or out of high mileage and high load-factor pools.

The road's E-9, E-8 and some of the E-7 passenger units are on a three- and six-year shopping schedule. The remainder of the E-7's and all the E-5 units are overhauled under a two-four- and six-year schedule. Freight locomotives are generally on a two-four-, and six-year schedule although the three-unit FT, F-2, F-3 and F-7 locomotives are now on a three- and six-year cycle along with the GP and SD road switchers. Switching locomotives usually receive general repairs every ten years. After thorough inspections, the switchers may be allowed to operate first eleven and finally up to

twelve years maximum before receiving general repairs.

West Burlington, Ia. shop is the major repair facility for all diesel locomotives on the railroad. Running repairs are given at the shop if an outside point does not have the facilities or equipment to do the work. In 1957 general repairs were given to 40 passenger units 80 freight units and 18 switching locomotives. Running repairs average nine per month.

The shop is divided into four bays—diesel erecting, and light and heavy machine bays. There are three repair tracks in the erecting bay, and all are available for repairing any type of locomotive. About 50 to 52 per cent of the repairs made are to locomotives and 48 per cent are repairs to component parts for the stores department. For example

power assemblies for the railroad are repaired at West Burlington, (RL&C April 1958, p32). The surplus, over and above the shop requirement is turned over to Stores. Outlying repair points return all defective power assemblies to West Burlington and receive replacements on an exchange basis. Returned assemblies are torn down; defective parts scrapped; assemblies are rebuilt and returned to stores department. In a recent change to increase piston life the top groove has been widened $\frac{1}{32}$ -in. for oversize width rings. If the performance is satisfactory all grooves may be widened $\frac{1}{32}$ -in. with a possibility of eventually going to $\frac{1}{16}$ -in.

Freight trucks are rebuilt every six years. Passenger trucks, at present on a 30-month period will shortly go to 36 months. Switch trucks are rebuilt every ten years. Hyatt boxes are overhauled on the basis of type of power, varying from three to four years. Almost all diesel locomotive wheel and axle assemblies are processed at West
(Continued on Page 43)



Special Report



Several multiple-unit diesels will be in shop at one time. Shopping is rigidly scheduled.

TYPICAL MONTH'S MILEAGES
for
BURLINGTON LOCOMOTIVES

(August, 1958)

LOCOMOTIVE TYPE	HIGHEST INDIVIDUAL	GROUP AVERAGE
Four-Unit Freight	16,579	12,588
Three-Unit Freight	10,378	6,924
GP-7 Road Switcher	9,035	4,600
GP-9 Road Switcher	5,507	4,122
SD-7 Road Switcher	11,181	4,942
SD-9 Road Switcher	14,071	8,552
Passenger	25,636	15,317

Intensive utilization and ingenious pooling produce these high locomotive mileages.



Light machine bay at West Burlington processes and reclaims many diesel components. Power assembly overhaul production line is under circular tramrail at center.



MAN... HAVE I GOT

Practically all equipment—new or reconditioned—
going into Piggy-Back service rides on
American Steel Foundries Ride-Control® Trucks.

Designed and developed through research by.....



IT SOFT!

(Soft riding, that is)



American Steel Foundries

Prudential Plaza, Chicago 1, Illinois

Canadian Manufacturer and Licensee: International Equipment Co., Ltd., Montreal 1, Quebec
Other Foreign Sales: American Steel Foundries, International, S. A., Chicago



Week's Work At West Burlington

WEST BURLINGTON overhauls one road freight locomotive almost every week of the year. For the two-year or three-year cycles, these freight locomotives go into the shop for five days and emerge completely overhauled and repainted. This is the schedule regardless of the number of units. The four- and six-year repairs cover additional items such as diesel main bearing renewals, main generator reconditioning including application of new bearings, and overhaul of air compressors, fuel pumps, radiator cooling fans, traction motor blower motors and dynamic brake blower motors. Following is a description of the work done each day during one of the two-year overhauls:

First Day

1. Each workman gets a slip outlining his work assignments.
2. Oil and water are unloaded from the diesel. Lubricating oil is pumped out of the shop through special drain lines.
3. Piping is removed to permit removal of engine. The engine and generator mounting bolts are removed.
4. All diesel engines must be out and on the shop floor at 11 am. This is true regardless of whether the locomotive has two, three or four units.
5. Generators and auxiliary generators are removed.
6. Traction motor blowers and radiator cooling fans are removed.
7. Batteries are taken out. The battery boxes are inspected, washed, and coated with paraffin. Battery gravity is tested and the batteries go back into the battery boxes.
8. Power contactors are removed. They are then repaired, lubricated and have new seals installed. When completed, these contactors are reapplied by the same workmen. All wiring is inspected.
9. Drinking water coolers, fuel pump motors and other small motors are removed, bench repaired, and re-applied.
10. Painters apply primer coat to outside of the locomotive.
11. Every effort is made to completely strip the locomotive this day.

Second Day

1. Interiors of the locomotive carbodies are cleaned.
2. Components removed in process of repair—such as water pumps, fuel pumps, oil pumps and blowers—are reapplied unless they have been found defective.
3. Power assemblies in each of the diesel engines are replaced with completely overhauled assemblies (RL&C, April 1958, p 32).

4. Painters apply second primer coat on outside. Taping for stripes is done.
5. Carbody interiors are painted during the night.

Third Day

1. In the morning, overhauled generators and auxiliary generators are installed in carbodies (these are "swing" units).
2. In the afternoon, diesel engines are washed, given first coat of paint, and installed in carbodies.
3. Painters apply final coats to outsides of all units.

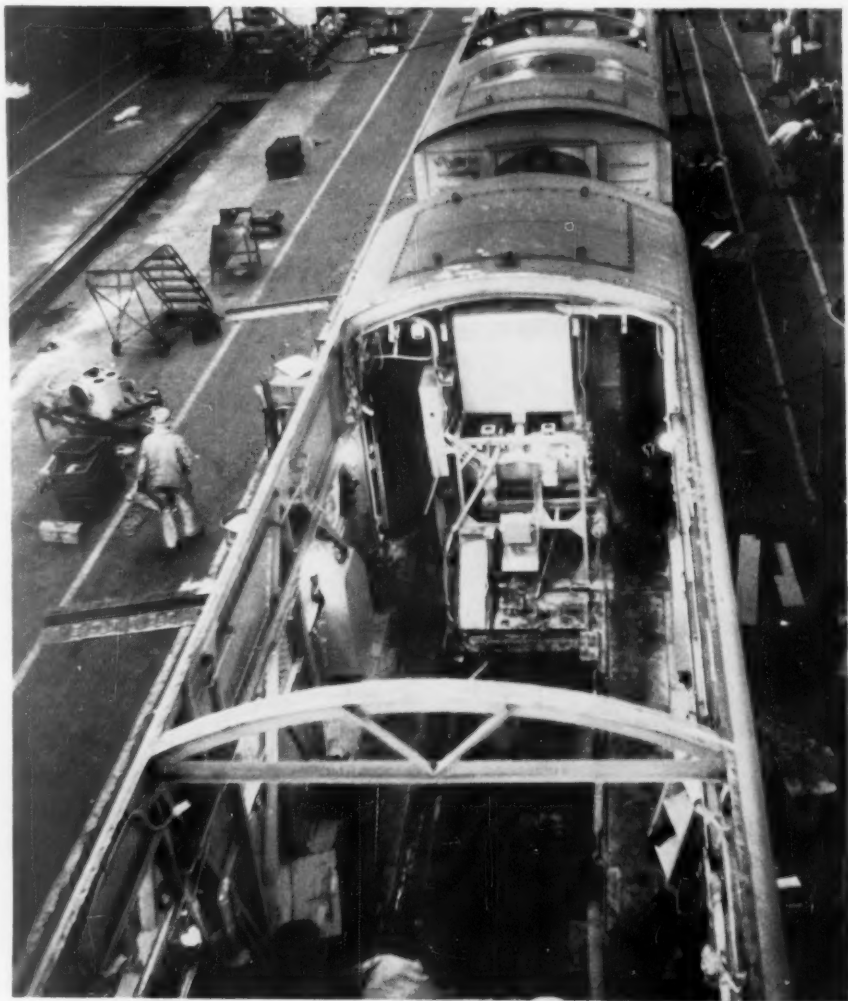
Fourth Day

1. Engines are aligned with generators and auxiliary generators.
2. Traction motor blowers, hatches, and cooling fans are reapplied.

3. Control air tests and hi-pot tests are made.
4. Engine is checked for leaks.
5. Oil and water are supplied to the diesel engines.
6. Painters finish by painting trucks, trim, and stenciling.

Fifth Day

1. Diesel engines must be running by 8 am.
2. Locomotive is moved outside and engines are loaded, using the dynamic brake grids. Brake warning relays are set. Engine is run under load for 2 to 2½ hours.
3. Engine is completely checked, re-tightened, and electrical equipment is checked.
4. Locomotive is released to transportation department about 3:30 pm.



Two road units have been stripped in the course of the five-day overhaul described above.

(Continued from Page 38)

Burlington. In addition to the wheel truing machine at Lincoln wheel lathes at Clyde and 14th Street, Chicago are used for some work on units operating out of those terminals.

Axle life on freight units is limited to 2.5 million miles, and on passenger locomotives to 1.5 million miles. There is no arbitrary limit set on the axles of switching locomotives. Minimum rim thickness allowed for wheels under passenger units is 1 3/8 in. freight units 1 1/4 in. and 1-in. for switchers. Wheel shop facilities have not been concentrated at one point because of the remaining steam locomotives. This power has until the present, served to protect peak traffic. Although heavy machine equipment for these locomotives is retained at West Burlington shop, no

steam power has been repaired there in over five years.

New Procedures

Labor and cost-saving devices are numerous in all departments at West Burlington. A tray holding diesel locomotive valves has been developed to facilitate cleaning in the Magnus cleaning tank. It consists of five circular shelves each holding 32 valves. An overhead crane places this tray and the valves in a cleaning solution. After 1.5 hours in the solution the valves are sent on for Zyglo inspection, buffing and grinding.

Original specifications for the early diesel passenger locomotives included

the application of stainless steel carbody side panels. This practice discontinued during the war, was resumed over the last ten years. The life of ordinary carbody panel has been found to be from six to nine years but the stainless panels installed on units built in the late 1930's are still in excellent condition. Lacquer aluminum paint is used on the carbody exteriors of units not equipped with the stainless steel panels. Recently the Burlington has been testing the possible extension of the repainting interval for its freight units from two to three years. This will be carefully studied because good appearance and tip-top mechanical condition are goals of the Burlington's shopping programs.

PERIODIC OVERHAUL DIESEL LOCOMOTIVE COMPONENTS

PROGRAMMED INTERVAL - YEARS

Main Bearing Renewal:

EMD Passenger, 12-Cyl Engines	6
EMD FT, F2, F3 and F7	4
EMD SD and GP Units	6
EMD Switcher, 567 Engines	10
Baldwin Switchers	4
Alco Switchers	5

Air Compressors:

Passenger	4
Freight	6
SD and GP Units	3
Switchers	10

Main Generators:

Passenger	6
Freight	6
SD and GP Units	6
Switchers	10

Auxiliary Generators:

Passenger	4
Freight	4
SD and GP Units	6
Switchers	10

Fuel Pump Motor - All EMD Units

	6
--	---

Radiator Cooling Fan Motors

	6
--	---

Traction Motor Blower Motors

	6
--	---

Dynamic Brake Blower Motors

	6
--	---

Electro-Pneum Governor Control

	2
--	---

Oil Coolers (Clean, renew gaskets):

Passenger, Freight, Switchers	2
-------------------------------	---

SD and GP Units

	6
--	---

Set Injector Timing, Lash

--	--

Adjustors, Racks, Engine Speeds,

Pilot Valves and Overspeed Trip	1/2
---------------------------------	-----

Calibrate Suction, Temperature,

Pressure and Shutter Switches	1
-------------------------------	---

Tighten Nuts, Bolts and Cap

Screws: Air Box to Oil Pan,	
-----------------------------	--

Engine Base, Accessory End,

Blower End, and Head Frame	
----------------------------	--

Cover and Exhaust Manifold

	1/2
--	-----

Mars Light Dynamotor

	2
--	---

Mars Light Mechanism

	2
--	---

Headlight Dynamotor

	2
--	---

Drinking Water Cooler Motor

	2
--	---

Speed Recorder and Drive

	6
--	---

Cab Heater Motors

	6
--	---

Defroster Motors

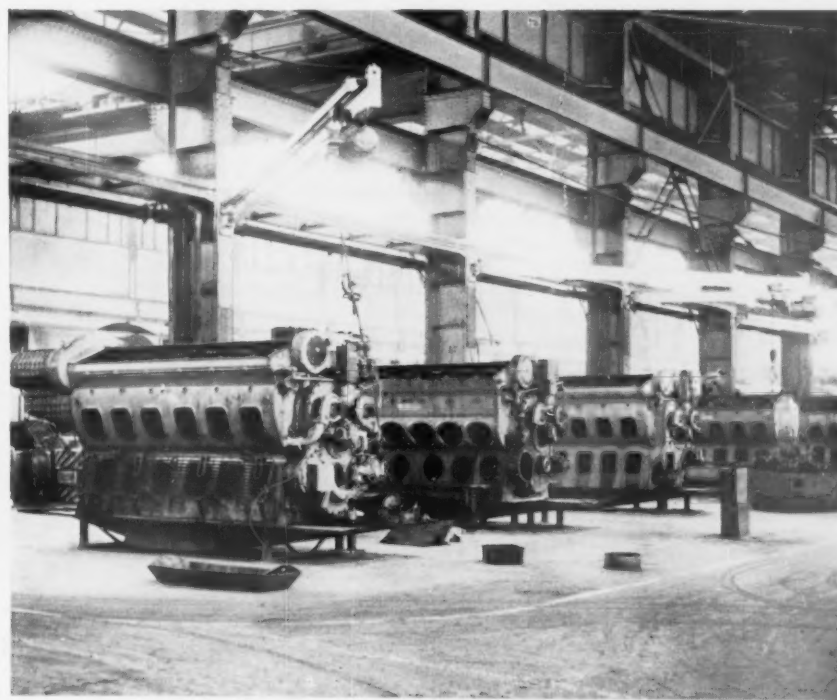
	6
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Shop-made black iron dust guards are used on diesel axles.



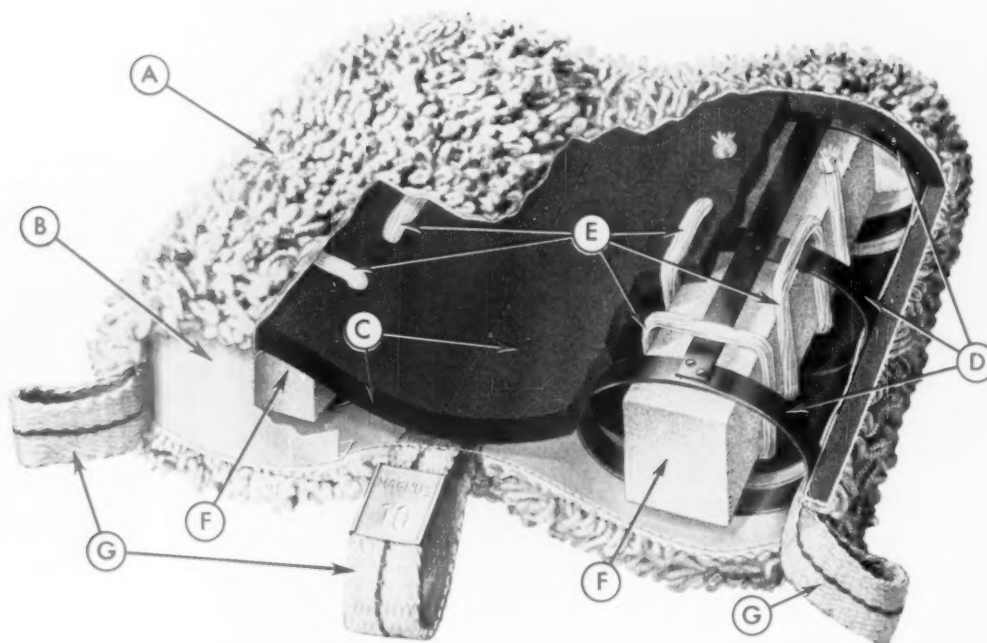
Circular rack is used for cleaning diesel valves in solvent tank.



Engines are removed from carbodies for the powerassembly replacement. This work is done in two days.

NOW—A CAR JOURNAL LUBRICATOR DESIGNED AND

IT'S THE *NEW MAGNUS*



FEATURES and ADVANTAGES

- (A) **Outer Cover** of tufted premium quality cotton yarn with heavy duck backing provides an ideal application and absorption surface which is glaze-resistant. It is washed and shrunk prior to assembly, assuring proper fit, and is stitched at both ends to prevent raveling and bunching in service.
- (B) **End Covers** of cotton bolting cloth web assure lasting strength and flexibility—keep dust and dirt out of the internal wicking materials—restrict oil loss.
- (C) **One-Piece Felt Pad** backs up the tufted cover and is formed around the two sets of steel springs and sewn together on the center line to make a single pad, with twin-lobe design—a far more rugged construction with better capillarity than if two separate pads were sewn together.
- (D) **Flat Steel Springs**—three firmly connected springs in each lobe maintain constant and correct pressure on the journal. Scaleless tempered spring steel will not sag and allow the pad to fall away from the jour-

nal. The springs are firmly secured to the underside of the felt and cover and are riveted to spring steel spacer strips—a construction that positively prevents misalignment or contact of springs with the journal.

- (E) **Internal Wicks** of 25-ply Bostonia provide 16 supplementary oil paths from the bottom to the top of each Magnus Lubricator Pad. Thus the design includes a combination of circumferential wicking, internal wicking and center feed wicking, assuring ample oil flow under all conditions.

- (F) **Polyurethane Cores**—used solely to increase oil reservoir capacity—make for greater margin of safety in event of oil starvation by contacting the 16 internal wicks.

- (G) **Extra-Strong Loop Handles** extend through pad centers, will withstand a pull of 300 pounds before failing. Additional loop handles are provided at each of the four corners. Brass nameplate on center loop carries the size identification. Magnus Pads are currently available in standard sizes for 5 x 9, 5½ x 10 and 6 x 11 car journals.

MAGNUS

Solid Bearings

MAGNUS METAL CORPORATION

BUILT BY JOURNAL BEARING EXPERTS

LUBRICATOR PAD

3-way wicking, large oil capacity, rugged one-piece twin-lobe construction are features of the MAGNUS journal lubricator that's now approved by AAR for interchange test installations

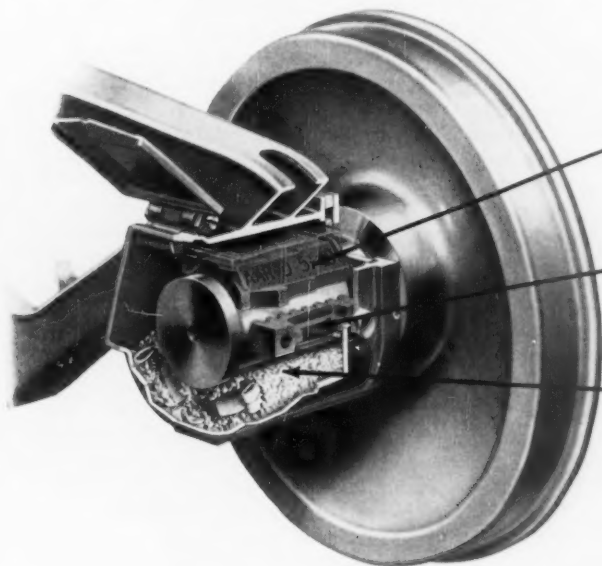
WHAT YOU need in a lubricator you get in the new Magnus Pad. First, there's maximum wicking — circumferential, internal, and center feed — to provide cooler operation and a far greater margin of safety in event of oil contamination. Internal wicks are *not entrapped* — wick more oil and are readily cleaned through normal reclamation process.

Then there's high oil-retention capacity — fully saturated, each Magnus Pad will hold more than 2.5 times it's own weight in oil — better than 5.9 pints for the 6" x 11" size.

The cover is heavy pre-shrunk duck tufted with premium quality cotton yarn (proved the most practical design) and backed with high capillarity felt.

It's positively held against the journal at all times by elliptical tempered steel springs that eliminate sponge-type uplift media. The springs are firmly secured to both felt and cover. The whole is a unique one-piece twin-lobe reversible design, self-centering on the journal — end-enclosed to restrain loss of oil. It's a lubricator pad designed by bearing experts to give railroads the performance needed.

Get the full story on the NEW MAGNUS LUBRICATOR PAD. We will gladly send you complete information and answer any detailed questions you may have regarding its construction and operating characteristics. Write to Magnus Metal Corporation; 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 4, Illinois.



For Tops in Bearing Performance at Lowest Possible Cost

Magnus Solid Bearings—Are easy to maintain or replace. They can take the maximum load, make the fastest schedule. They save excess weight and have the lowest possible running resistance in pounds per ton.

Magnus R-S Journal Stops—Positively prevent excessive axle displacement during impact, braking, switching and humping. The result is better bearing performance with far lower maintenance, doubled bearing life, and reduced wheel flange wear.

Magnus Lubricator Pads—Provide a constant and uniform oil film for solid journal bearings. Three-way wicking, large oil reservoir capacity, rugged one-piece twin-lobe construction—these are three of the features that make Magnus Pads your best bet for efficient pad journal lubrication.

Subsidiary of **NATIONAL LEAD COMPANY**





Light repair tracks for freight cars on the Burlington are characterized by their neatness. This installation at Lincoln has paved platforms between the tracks.



Maximum availability is assured for Burlington streamliners by arrangement and facilities of coach yards. Busiest point on the railroad is this 14th Street Yard, Chicago.

'Q' Keeps Its Cars on the Move

Repair and servicing facilities make possible the intensive use to which the Burlington puts its freight and passenger equipment

THE FOUR LARGEST light repair tracks on the Burlington are at Cicero (near Chicago), Galesburg, Kansas City, and Lincoln. All have one common feature—concrete platforms between the tracks. Cleanliness and orderliness are emphasized. Work equipment, painted a distinctive yellow, is kept neatly arranged along the tracks. Some facilities have speaker systems. Most material handling is mechanized. Several repair tracks have lathes for reworking cut journals, and some have brass boring machines. Fire protection equipment includes hose houses with reels and carts, and hand extinguishers. Snow brooms are available for winter use.

In addition to light and running repairs, some heavy repair programs are scheduled at the major light repair tracks. These include heavy repair programs for steel box cars and flat cars. At other times programs include repair and repainting for covered and open-top hoppers. Work involving more than 20 man hours per car is classified as a "heavy" repair.

A special feature of the Galesburg rip is a stub cleaning track adjacent to the west classification yard. It has a capacity of 45 to 47 cars and has been in operation for about a year. A novel method for carding cars for the cleaning track is used. Standard bad order cards are applied vertically to cars by inspectors in the receiving yard. When these cars go over the hump, the hump operator can instantly spot the vertical cards and routes all cars so designated to the cleaning track. A hot water Upgrader cleaner is used on about 15 to 20 cars per day. This takes about 15 min per car. The cleaning track is equipped with a 2-in. water line and a 1½-in. air line. Hydrant cocks are located every 100 ft. After cleaning, cars are inspected and carded for commodities. The inspection includes a check of piston travel, application and release

brake test, and inspection of safety appliances.

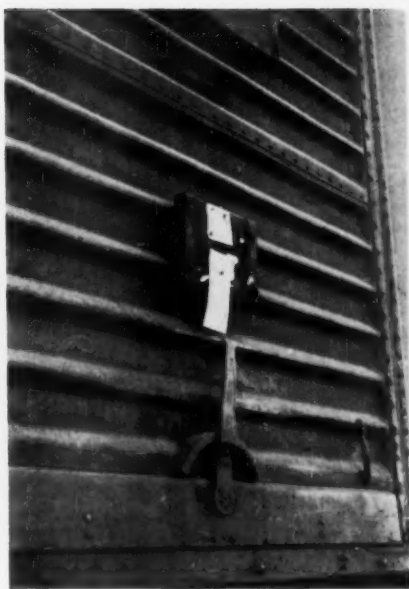
One card is used by inspectors in classifying cars, both in classification yards and rip tracks. The card is 3¾ in. square and has four classifications on each side. The Burlington uses five general classifications which grade cars from top quality downward: Sugar, Flour, Grain, Merchandise, and Rough Freight. A blank space is on the card for any other merchandise.

The mounting and turning of freight car wheels and axles is handled at four points on the railroad. The average numbers of wheel sets handled per month at these points are Galesburg—834; Havelock—772; Lincoln—669; and Alliance, Neb.—282. Galesburg and Havelock handle some solid bearing passenger car wheels. In addition Havelock turns passenger car and locomotive wheels. Truing of diesel locomotive wheels is done at Lincoln.

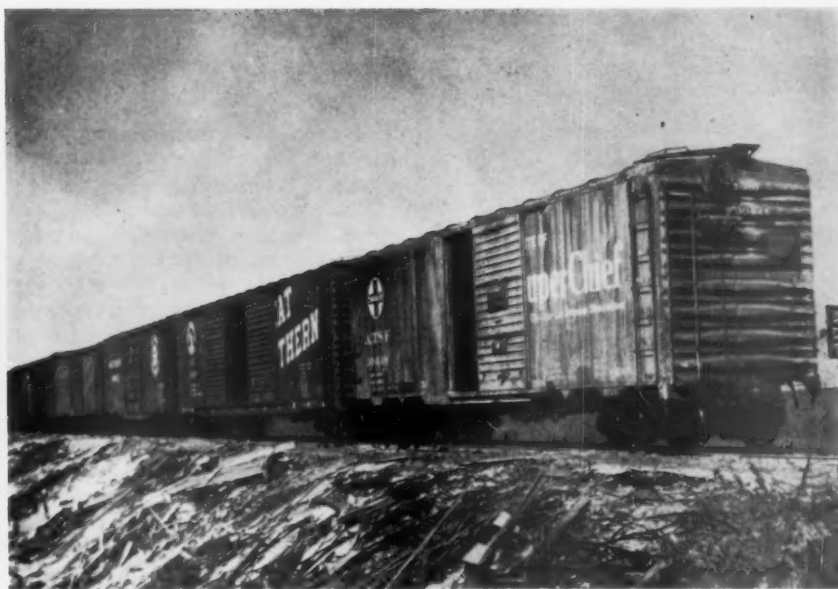
All diesel locomotive wheels and axles are done at West Burlington. Solid
(Continued on Page 48)



Special Report



Vertical bad-order card on the placard board tells hump operator at Galesburg that the car should be switched to the cleaning track.



Cars on cleaning track at Galesburg are inspected and classified. Small repairs may then be made without switching them to rip track. Track is equipped for washing and cleaning. Cars are then classified for the highest commodity group which their condition will permit.

OUTPUT OF SHOPS AND REPAIR TRACKS Monthly Average

	LIGHT REPAIRS	HEAVY REPAIRS
FREIGHT CARS		
Alliance	1200	--
Burlington	176	--
Casper	462	--
Centralia	2452	--
Cicero	1430	--
Council Bluffs	264	--
Creston	150	--
Denver	800	--
Eola	616	--
Gibson	1100	8
Galesburg	2200	45
Guernsey	600	--
Hannibal	350	--
Havelock *	25	95
Lincoln	2640	60
McCook	330	--
Murray	2500	44
Ottumwa	150	--
E. St. Louis	375	--
N. St. Louis	528	--
St. Joseph	530	--
Daytons Bluff	10 00	--
Savanna	200	--
Sheridan	500	--
PASSENGER CARS		
Aurora	7	5

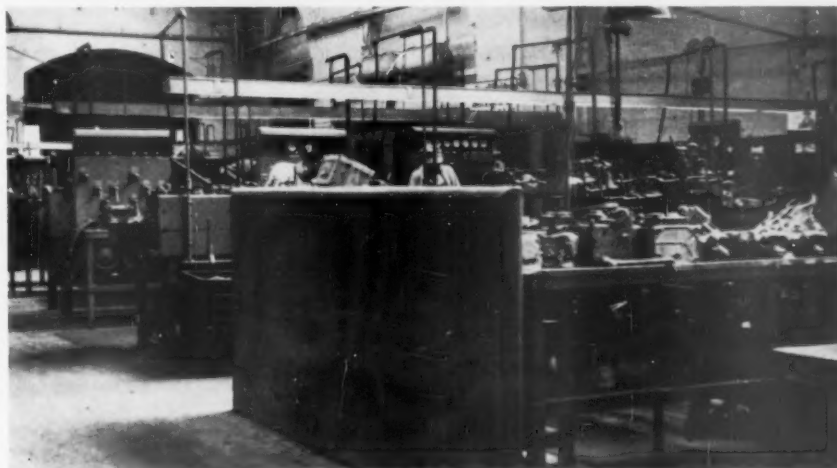
* - Havelock Shop has been building new cars at an average rate of 141 units per month.



Hot water for washing car interiors is supplied by this Upgrader jet steam cleaner.

O. R. CEMENT	
O. R. FLOUR	O. R. GRAIN
No. Initial INSPECTOR: _____ PLACE _____ DATE _____ No. Initial SUGAR O. R.	

Card is applied by inspectors in classification yards to grade cars from top quality downward.



Approximately 33,000 pieces of brake equipment are turned out annually by Aurora brake shop. All passenger brake portions and about half of freight-car equipment are processed here.



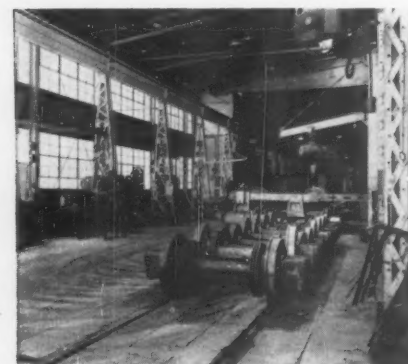
Drop pit at 14th Street, Chicago. Zephyr servicing must be high-speed operation.



Wheel storage tracks at Lincoln, one of four points at which wheels are mounted and turned.



Rip tracks at a number of points have been equipped with these Ajax brass boring units.



Roller-bearing passenger-car wheel and axle assemblies are handled at Aurora shop.

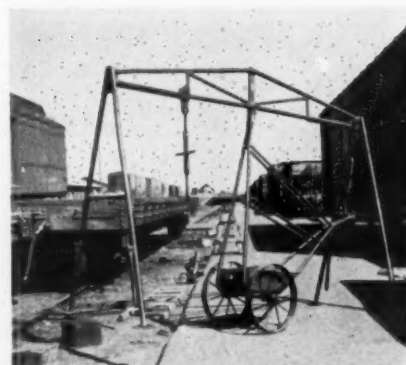
bearing passenger car wheels are turned at this point for Galesburg. All roller bearing passenger car wheels and axles are handled at Aurora Shop. Clyde (Cicero) turns freight and switch engine wheels. Chicago, 14th Street, turns passenger car and passenger locomotive wheels.

Burlington mechanical people from top officers to car inspectors and oilers, are well aware of the consequences of hot boxes. A continuing program is carried on to eliminate the conditions that cause hot boxes. Lubricator pad applications are being made at a rate of 962 car sets per month on company cars, excluding cars in series that are being periodically retired. By December 1, 1958, about 35 per cent of Burlington-owned cars were pad-equipped. Several types of pads are being applied in the program and other types are being tested.

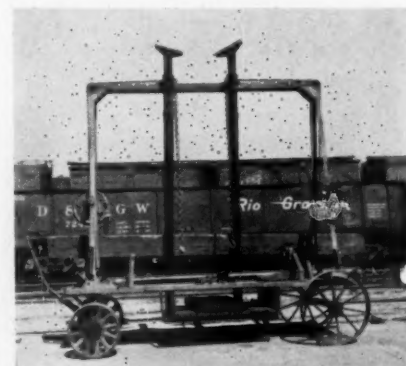
Cars passing over the hump at Galesburg and Lincoln for classification have already had their trucks inspected. In the receiving yard a thorough examination of the boxes is made, packing is adjusted, and lids are left open. At the hump, oilers on both sides apply oil to each box as car passes by. The boxes again are examined after the train is made up. The lids are then closed. At Denver, oiling is done as trains move out of the yard. Two men on each side apply oil and close the box lids. Drums of oil, car brasses, lids, and other car materials are stocked at intervals along the tracks in most yards.

Aurora shop is not only the primary maintenance and repair center for passenger cars on the Burlington but it also manufactures many parts for diesel locomotives and freight cars. Among the sections which do repairs on a system basis, is the Air Brake Department. All brake equipment for the Burlington's passenger cars and passenger diesels is dismantled, repaired and tested. About 50 per cent of the yard switcher and switcher equipment is processed, along with 60 per cent of the freight car brake portions. Some 33000 pieces represent a year's output, and this will include all air and steam gauges for the railroad.

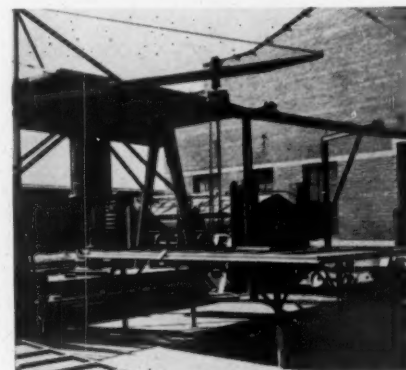
Eola Scrap Yard and Reclamation Plant, under direct supervision of the Superintendent of Scrap and Reclamation dismantles about 400 cars annually in addition to sorting and preparing scrap for sale. Among the many car parts that were either reclaimed or manufactured during a recent year were 27,000 air brake hoses, 5,500 signal hoses, 8,900 brake beams, 2,600 journal boxes, 1,000 truck side frames, 500 bolsters, 800 couplers and 8,100 angle cocks.



Movable A frame is used at Galesburg rip track for the disassembly of Unit trucks.



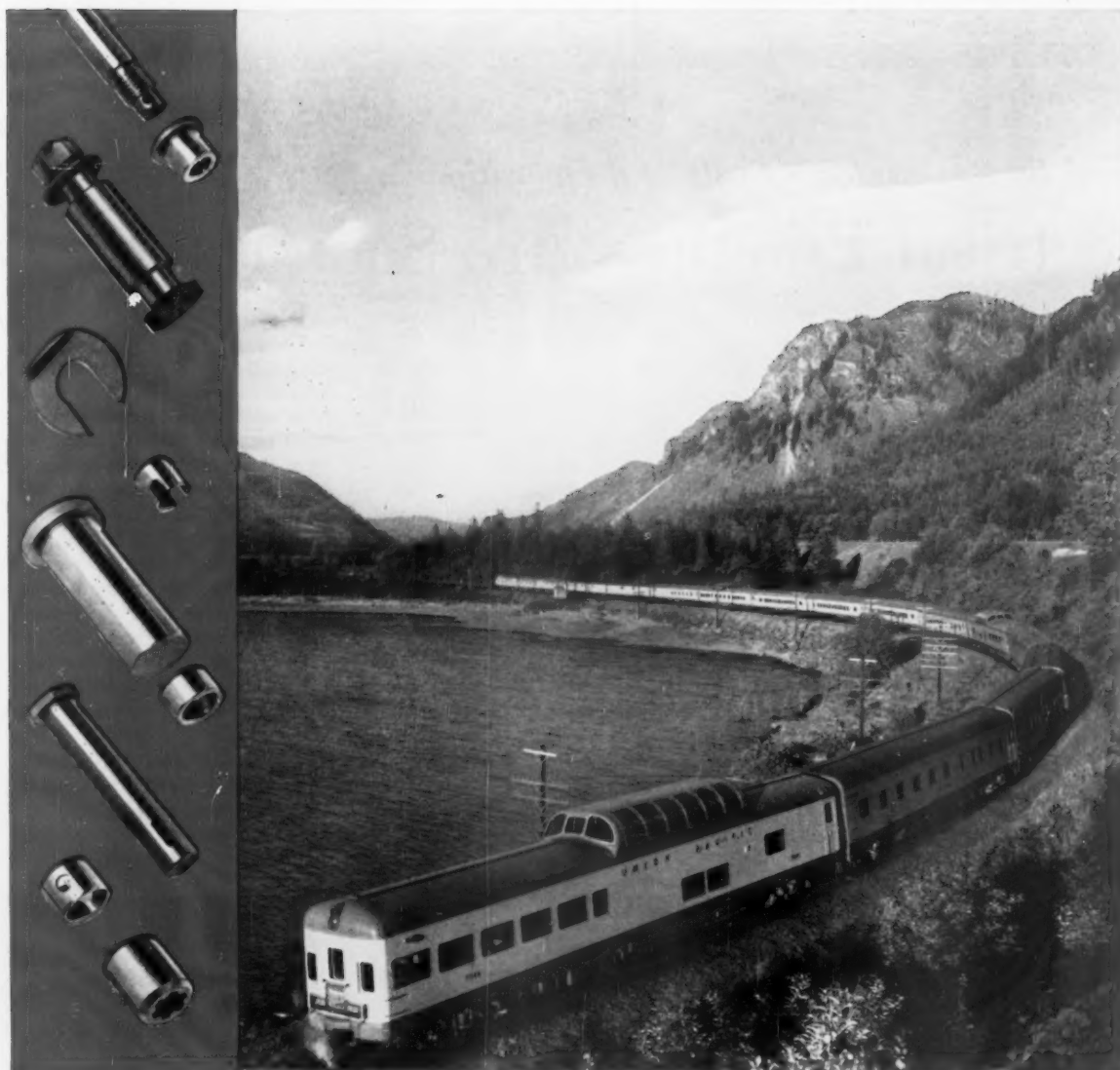
Portable device used at one rip track for straightening bulged freight-car ends.



Air-operated device simplifies straightening of box-car doors at the Lincoln rip track.



Silk screen process is used at Eola to produce colorful Burlington emblems.



Union Pacific Railroad Photo

Ex-Cell-O Pins and Bushings take high speed torture out of a million turns

Imagine the stress and strain on the pins and bushings as these passenger cars roar around this curve in the Columbia River Gorge. Ex-Cell-O Pins and Bushings—performing for over 200 railroads—take this kind of treatment every day. Often are usable up to a million miles because of a super-fine finish. Electronically controlled heat treating assures a deep, diamond-hard steel case. Dust, strain, abrasion, weather, sudden jolts—Ex-Cell-O Pins and Bushings shrug them off over the miles.

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ELECTRICAL SECTION

Proved By Burlington's Costs and Operations...

Electrical Practices Are Sound

TODAY'S LOCOMOTIVE electrical maintenance and servicing policies on the Burlington have evolved through almost 25 years during which the road has operated diesel electrics. Even this was preceded by extensive operations of gas-electric rail cars. In addition, the comfort and reliability of one of the nation's finest main-line and suburban passenger operations are assured by practices developed for handling modern coach electrical equipment.

West Burlington shop is now tooled to repair all the traction equipment on 683 diesel units and 15 rail cars. The electrical section of the West Burlington Ia. shop is divided into eight departments located across from each other along the aisle at the center of



Special Report

the diesel bay. The road does almost all of its own electrical overhaul work and the diversity of these departments indicates the scope of these operations. The departments are:

1. Armature winding department which handles traction motors, main generators, auxiliary generators, traction motor blower motors, cooling fan motors and similar equipment;
2. Control and small equipment repair department which works all contactors and relays;
3. Electrical machine department

which balances all rotating equipment both statically and dynamically. Equipment includes two balancing machines, one 16-in. lathe, one 48-in. lathe a 400-ton vertical press; and two armature banding machines;

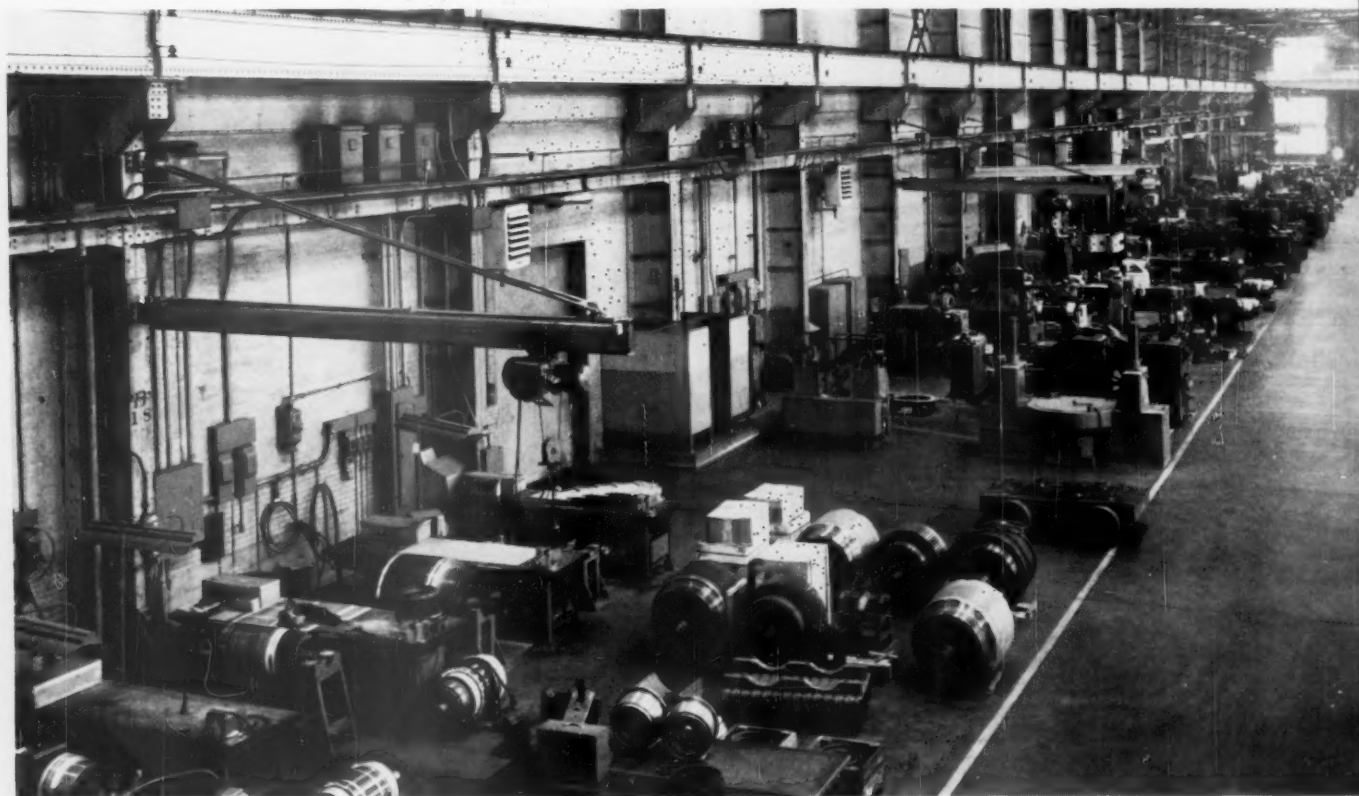
4. Varnishing and baking department where the equipment consists of impregnating equipment and three ovens;

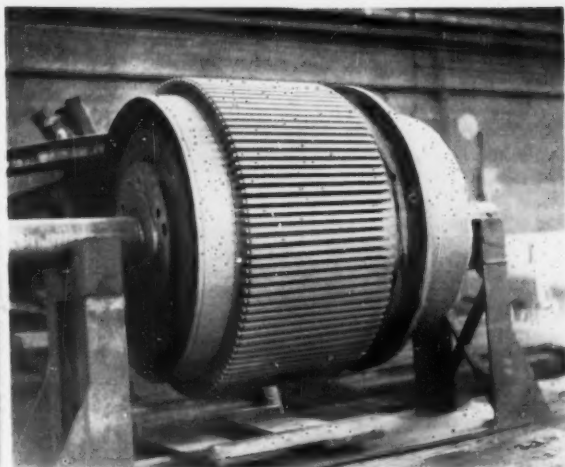
5. Armature bearing assembly department where these critical roller bearings are inspected and applied;

6. Cleaning department which is equipped with a cleaning booth and a degreaser;

7. Traction motor department where motors are stripped, inspected, repaired, assembled and tested;

8. Generator department where gen-

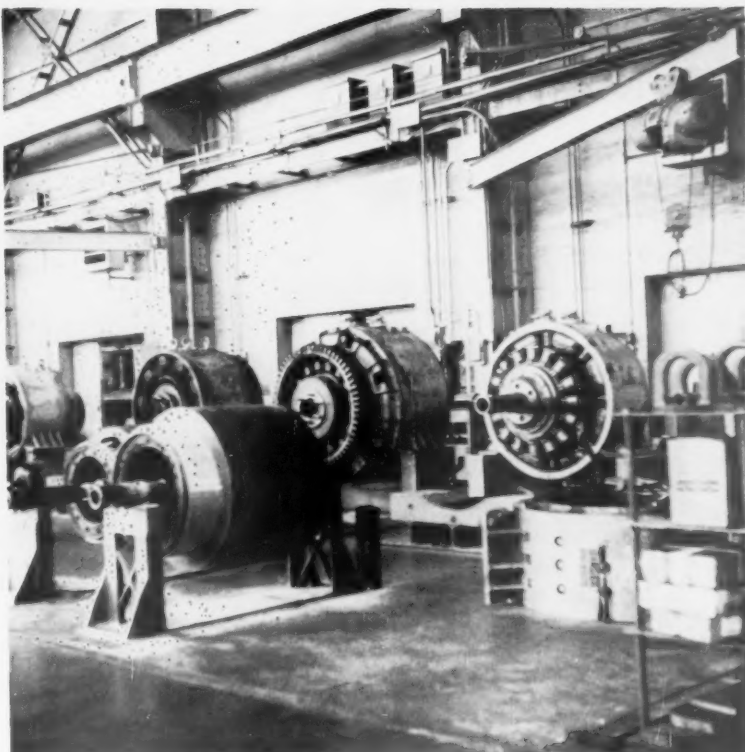




Main generator armature cores are now cleaned with fly ash from power house.

erators are processed in the same way that traction motors are handled.

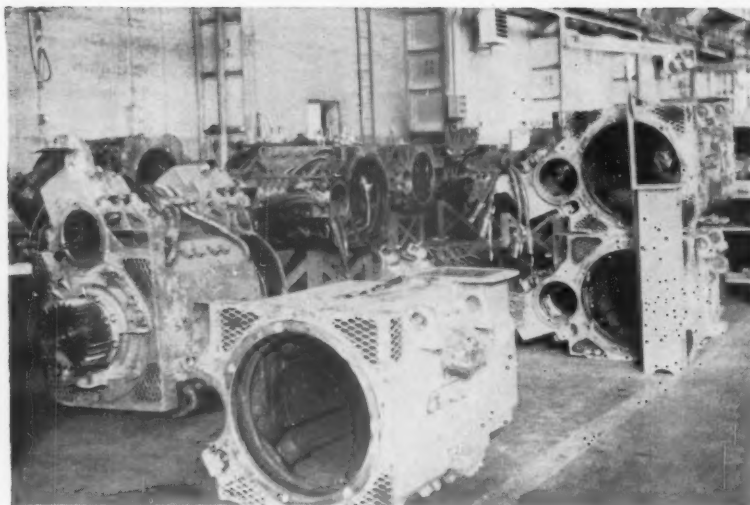
Main generators on freight and passenger units are removed and cleaned at specified intervals. At the six-year overhauls the generators are reconditioned and new bearings are applied. Traction motors are repaired on the following basis: 400,000 miles for passenger units, 500,000 miles for freight units, and 10 years for switching locomotives (in conjunction with general overhaul). Typical daily output at West Burlington is usually five motors.



Main generator frames stand on special stands for completion of assembly.

The electrical section of West Burlington Shop is composed of eight special departments which process most of the electrical components of the railroad's diesel locomotive fleet. Rewinding and balancing are done at left foreground. At right is the section where small parts are reworked and back of that is the impregnating and baking equipment.





Burlington emphasizes cleanliness and this extends to traction motor exteriors which are color coded after rebuilding.



Stand elevates traction motor and holds it in vertical position to simplify installation of brush holders and the covers.

Experiments using epoxy materials for repairs to motors and connections have been proving satisfactory. The epoxy material is now used over all string bands on traction motor armatures. Limited tests are now under way on the use of Fibreglas tape to take the place of the original steel banding on armatures. A systematic program has seen grease eliminated from almost all traction motor armature bearings. They are now lubricated with oil.

Fly Ash Cleaning

Labor and cost-saving methods are characteristic of West Burlington shop. As an example armature cores of generators and traction motors are cleaned with fly ash from the shop power plant. Core slots are initially cleaned by hand to remove some of the mica. This is followed by cleaning with the fly

ash delivered through a standard air-operated sanding device. It takes about one hour to clean the core of a main generator and about 20 minutes for a traction motor core. When sand was used its peening action against the soft iron core restricted the openings so it was difficult to apply the coils.

A stand in the electrical department makes it possible to stand the traction motor on end to simplify the application of brush holders and cover plates.

The Burlington has, in general, maintained the electrical and control equipment of its locomotives as it was originally built. Locomotives are rewired by inspection, and complete rewiring is not part of a scheduled program.

Car Maintenance

Locomotive and passenger car batteries are reworked at the coach shop

at Aurora. Aurora handles the overhauling of motors and generators for all passenger cars. Genemotors are changed out each year on all high-mileage passenger equipment. This scheduled preventive maintenance is assigned at Chicago and Minneapolis. The Genemotors are then completely overhauled before going back under other cars. Industrial motors for the system are repaired and rewound at the Aurora and Havelock electrical shops.

Sixty cabooses are now equipped with axle generators. Older installations are 32-volt systems and the later cars have 12-volt generating equipment. Some other cabooses have 12-volt storage battery systems without generators. The 12-volt batteries are charged with portable battery chargers (110-volt a-c to 12 volt d-c). Charging of the 32-volt batteries on cabooses is done with engine-driven portable machines.



Electrical systems on newer cabooses are providing power for interior lighting and for train radio. Some cars have heavy-duty 12-volt batteries.



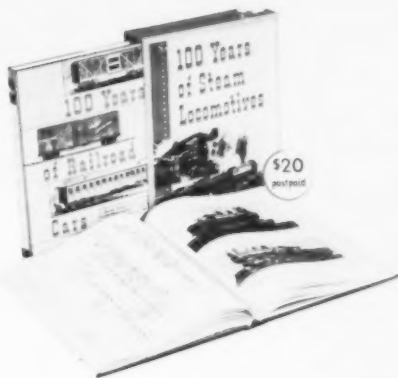
Preventive maintenance for some Genemotors is handled at 14th Street, Chicago.

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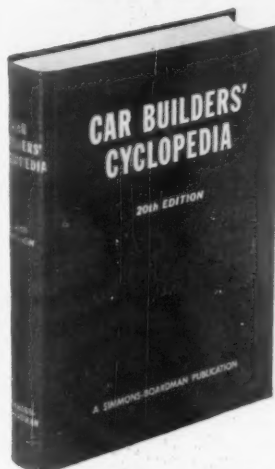
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* First edition published in 1879 by the
 Master Car Builders' Association

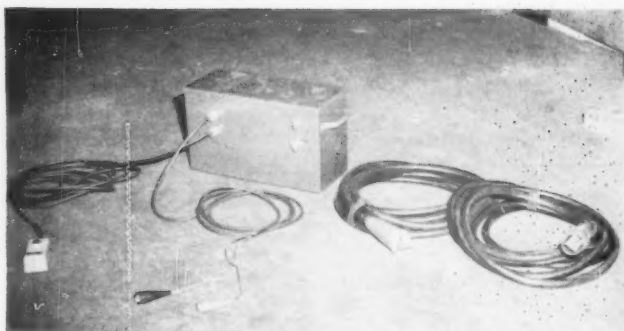
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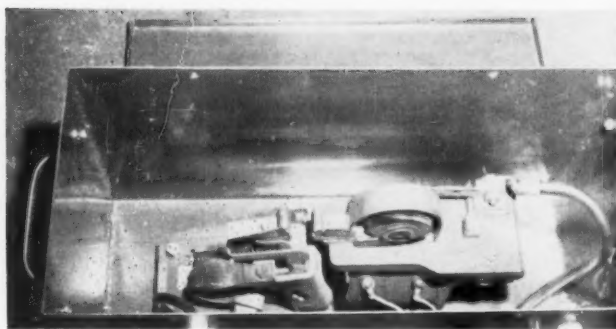
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All the gear required to move locomotive by means of its own battery.



Interior of "magic box" showing power-closed, spring-opened contactor.

Moving Locomotives in the Shop

A SIMPLE ARRANGEMENT for moving locomotives in the shop or other places where it is undesirable or impossible to use the engine, has been developed in the Milwaukee, Wis. shops of the Chicago, Milwaukee, St. Paul and Pacific.

The complete equipment required, including the so-called "magic box", is shown in one of the illustrations. The locomotive is moved with its own battery and the equipment consists of two power cables, a box containing a starting contactor, a control cable which permits remote pushbutton closing of the circuit breaker and a light two-wire

cable to bring power from the battery for operating the circuit breaker. Locomotive starting contacts such as the one in the box are normally opened by gravity, but this one is fitted with a spring which assures its opening with the box in any position when the pushbutton on the control cable is released.

For operation on FT locomotives, one of the power cables is secured to the negative or hot side of the locomotive starting contactor. The other lead is clipped to the stationary side of the S contactor. A $\frac{3}{4}$ -in. brass nut is then placed between the contacts on the positive side of the starting contactor. The

leads from the pushbutton coil are connected by clips across the positive and negative of the battery switch.

When the contactor in the box is energized by pressing the pushbutton, two motors in parallel are connected across the battery and the locomotive is moved slowly. On F-3 locomotives the positive cable is clipped to the movable side of the S14 contactor and on F-7's to the stationary side of S23. The method may be used on all of the various types of locomotives.

Care must be taken to have air pressure for braking on the locomotive when it is moved or, if necessary, the hand brake may be used.

With such equipment available, the use of tractors or switching locomotives is eliminated.

From the Diesel Maintainer's Note Book

Diesel With Mixed Up Cooling

B. A. Striver

A RECENT EXPERIENCE with an Alco road switcher illustrates how grounds on controls can tie in with one another with surprising results. This locomotive came in with a report that the engine water cooling fan continued to run even though the engine temperature was low. An examination of the fan control panel indicated that fan relays were open. A test for ground showed that the eddy current clutch coil was grounded, but with a single ground there should not have been

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

a circuit to run the fan. There was no visible defect that could be cleared.

A check on the control circuits showed another ground and this was found to be in the auxiliary circuit 51A wire, which feeds the drinking water cooler motor, the cab heater motor and the gage lights. It is connected to the various circuits at a terminal strip located in throttle stand. By a process of elimination, it was found that the ground was in the drinking water cooler circuit.

The ground was caused by one wire being pinched between the back of the receptacle and the bushing on the end of the conduit. This conduit projected through the back of the box and was



rather long. New wire and a new receptacle cleared the ground, and the engine water cooling fan was again under the control of the fan control panel. The eddy current clutch coil was changed out later.


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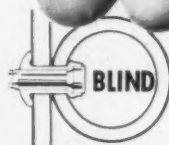


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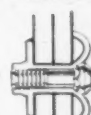
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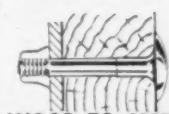
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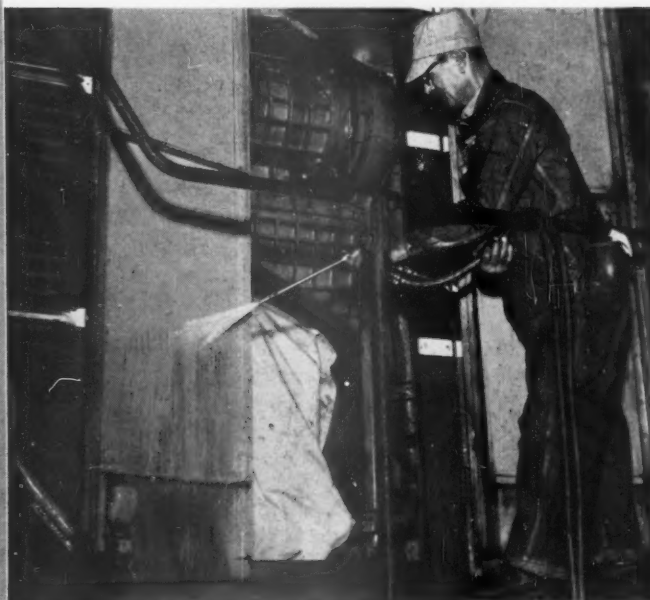
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Personal Mention

Canadian National.—*Moncton, N.B.:* DAVID A. FOSTER appointed Maritime district superintendent of motive power and car equipment, succeeding W. H. BOULAY, retired. J. R. KEMP appointed mechanical engineer, Atlantic region, succeeding Mr. Foster. Mr. Kemp previously assistant mechanical engineer at Winnipeg, Man.

Central Vermont.—*St. Albans, Vt.:* DELBERT M. BRESSETTE, mechanical engineer, appointed superintendent of motive power and car equipment, succeeding C. H. LOCKHART, retired.

Chesapeake & Ohio.—*Richmond, Va.:* H. J. BAKER appointed general superintendent car department, succeeding E. C. ELLIS, retired. Jurisdiction of J. C. SMITH, general master mechanic, extended to include Hinton division. *Grand Rapids, Mich.:* H. M. VISE, JR., assistant superintendent car department, appointed superintendent car department, succeeding Mr. Baker.

Chicago, Milwaukee, St. Paul & Pacific.—*Milwaukee:* MARTIN WANGBERG appointed assistant superintendent air brakes. Formerly traveling engineer, Trans-Missouri Division.

Erie.—*Buffalo:* JESSE H. SMITH appointed general foreman, Buffalo Division. *Jersey City, N.J.:* GEORGE T. FLEMING appointed general foreman, N.Y. and Terminal divisions. *Port Jervis, N.Y.:* FRANK L. VAN SCHAICK appointed supervisor of locomotive operation. *Dunmore, Pa.:* FRED WILLIAMS appointed general foreman, Wyoming division. *Hornell, N.Y.:* JOHN E. BOWEN appointed division car foreman, Susquehanna division. *Meadville, Pa.:* CHARLES E. SCHUETTE appointed division car foreman, Allegheny, Meadville and Bradford divisions. *Marion, Ohio:* CHARLES M. STUBBS, assistant master mechanic, appointed master mechanic, succeeding HARRY I. PHELPS, retired.

Great Northern.—*Spokane, Wash.:* H. M. WHYTE appointed superintendent of motive power, succeeding R. A. SMITH, retired. E. N. ROBERSON, diesel supervisor, appointed traveling engineer, succeeding R. E. JOHNSON. *St. Paul, Minn.:* J. G. GERMAN appointed assistant to the chief mechanical officer, succeeding Mr. Whyte. *Seattle, Wash.:* T. W. MACKENROTH appointed master mechanic, succeeding Mr. German. *Great Falls, Mont.:* R. E. JOHNSON appointed master mechanic, succeeding Mr. Mackenroth.

H. M. WHYTE, now superintendent of motive power at Spokane, began GN career in 1926 as a laborer and machinist helper at Great Falls. He later became machine foreman; foreman wheel shop at St. Paul; shop superintendent at Superior, and in 1954 assistant to chief mechanical officer at St. Paul.

Illinois Central.—*Chicago:* ROLLIN J. CHINN appointed mechanical and shop engineer. *McComb, Miss.:* B. D. VENABLE, appointed master mechanic, succeeding Mr. Chinn. Mr. Venable formerly assistant master mechanic at Memphis, Tenn.

New York Central.—*New York:* W. J. ROHRER appointed manager equipment personnel, succeeding D. R. CRAFT, deceased. J. J. WARD appointed supervisor personnel-mechanical, succeeding Mr. Rohrer.

New York, New Haven & Hartford.—*New Haven, Conn.:* D. S. ONNEN, chief engineer, equipment, appointed director of research. A. T. PEAGAN, director, research and planning-operating, appointed assistant general manager-engineer. R. W. HOOPER, general mechanical superintendent, appointed general superintendent—car department. G. A. CLARKE, assistant general mechanical superintendent, appointed chief mechanical engineer. W. A. BAKER, general superintendent locomotive maintenance, appointed general superintendent—locomotive department. R. H. DAVIS, assistant director research and planning, appointed superintendent car department.

Seaboard Air Line.—*Richmond, Va.:* H. R. BOYETTE appointed mechanical engineer. Formerly diesel supervisor (system).

Southern Pacific.—*San Francisco:* GEORGE W. KAHLER, assistant electrical engineer, retired.

Supply Trade Notes



Douglas V. DeGeer



Lionel DeWaltoff

WYANDOTTE CHEMICALS CORPORATION, J. B. FORD DIVISION.—*Douglas V. DeGeer* appointed special representative, railroad sales department, covering sales and service to railroads in Minneapolis and Chicago.

OCTAGON PROCESS, INC.—A fully equipped "Industrial Technical Service" research and development laboratory, independent of main laboratory, formed at 15 Bank street, Staten Island, to aid in problems involving degreasing, phosphating, plating, rust prevention, paint stripping and production cleaning. *Lionel DeWaltoff* appointed technical director of this division.

K S M PRODUCTS, INC.—A new warehouse and sales office established at 656 Folsom street, San Francisco. *John T. Raynor*, former district sales engineer for Philadelphia, appointed regional sales manager,

Results for the CB&Q— AND YOU!



No. 3.—five electrode Cheston, for high production positions—the workhorse of the railroad car shops. Other models for heating two and three rivets at a time.

The Burlington has a full complement of Cheston Electric Rivet Heaters working in its car shops at Havelock. This outstanding customer, together with the scores of other railroads and car builders that we have served for many years, knows that the best results are achieved with the best equipment.

Economy, convenience, added efficiency, improved workmanship, better shop conditions, good housekeeping, and year after year of trouble-free service are built into the Cheston Rivet Heater . . . Total operating costs average 15¢ or less per 100 lbs. of rivets heated, a 75% reduction in rivet-heating expense in most shops . . . Production within seconds of starting up permits stepped-up working schedules and eliminates Waiting Time losses . . . There is no pre-heating expense, or fuel waste

during idle periods . . . Rivets are heated as needed, rather than burned or coked by the shovel-full, and the electrically-heated rivet has no scale or diameter loss, and its superheated core allows clean, full, tight heading . . . No compressed air is required by the Cheston, so pressure formerly lost to blast-type heaters is added to the tools for faster, better work . . . Heat, smoke, grime and fire hazards are all eliminated . . . Operation of the Cheston is both simple and comfortable, and with the Removable Contact Blocks now standard for our equipment, new-heater performance is maintained year after year with no downtime and next to no expense.

These many advantages have made good sense to the Burlington, and to progressive railroads the world over.

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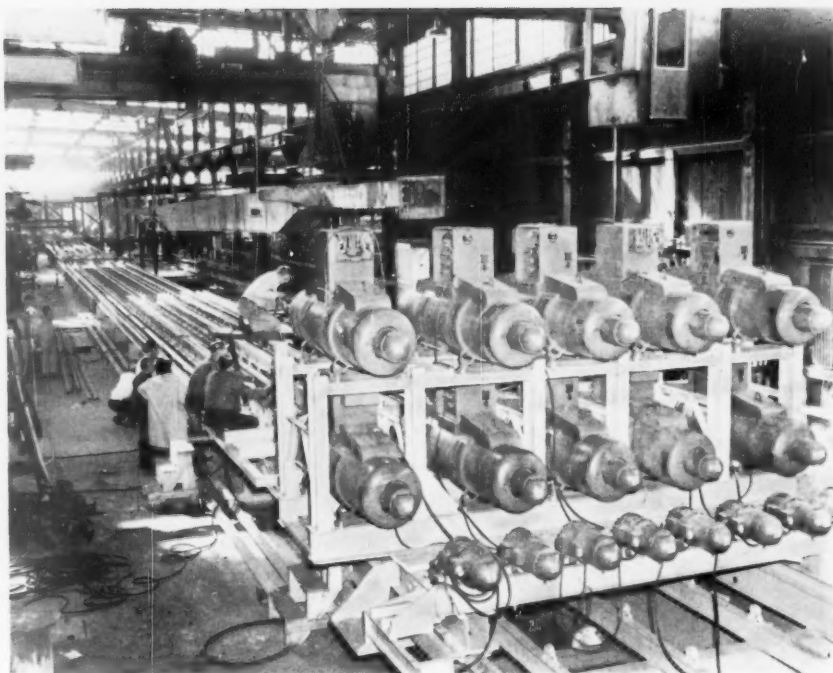
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This automatic submerged arc-welding machine, said to be the largest ever developed for a single welding operation, was designed and built by the Pullman-Standard Car Manufacturing Company and installed at its Butler, Pa., freight-car plant for use in the mass production of 85-ft flat cars for piggyback service. The unit, with its extending jig 385 ft in length, employs 20 welding heads which simultaneously make 10 welds approximately 85 ft in length. It is being used in the construction of 462 flat cars ordered from Pullman-Standard by Trailer Train, the Union Pacific, and the North American Car Corporation. Twelve cars a day are in mass production.

Pacific area. Assisting Mr. Raynor is F. G. Kern, district sales engineer for San Francisco and Northern California. F. Leonard Hultquist appointed sales engineer at Los Angeles where a new office has been established at 1238 S. Atlantic Boulevard.

K W BATTERY COMPANY.—Ralph M. McLean, Jr., Progress Railway Supplies, Inc., St. Louis, appointed K-W sales representative to railroads in St. Louis area.

STRAN-STEEL CORPORATION, DIVISION OF NATIONAL STEEL CORPORATION.—C. V. Blackburn, vice-president sales, appointed executive vice-president. Julius G. Skaaren, manager of building sales, appointed general sales manager.

ELECTRIC STORAGE BATTERY COMPANY, EXIDE INDUSTRIAL DIVISION.—Roland Whitehurst, vice-president, retired October 31.

Administrative, sales and accounting departments of Industrial division, formerly in Robinson building, Philadelphia, moved to Philadelphia plant at Rising Sun and Adams avenues. Corporate offices moved to 2 Penn Center Plaza.

HUNT - SPILLER MANUFACTURING CORPORATION.—J. E. Ostrowski, railroad representative, appointed assistant sales manager at Boston.

BIRDSBORO STEEL FOUNDRY & MACHINE CO.—Ralph Wilson Brown and Robert V. Simpson appointed railway and industrial sales representatives.

(Continued on page 60)

"TORQUE WRENCH" MANUAL

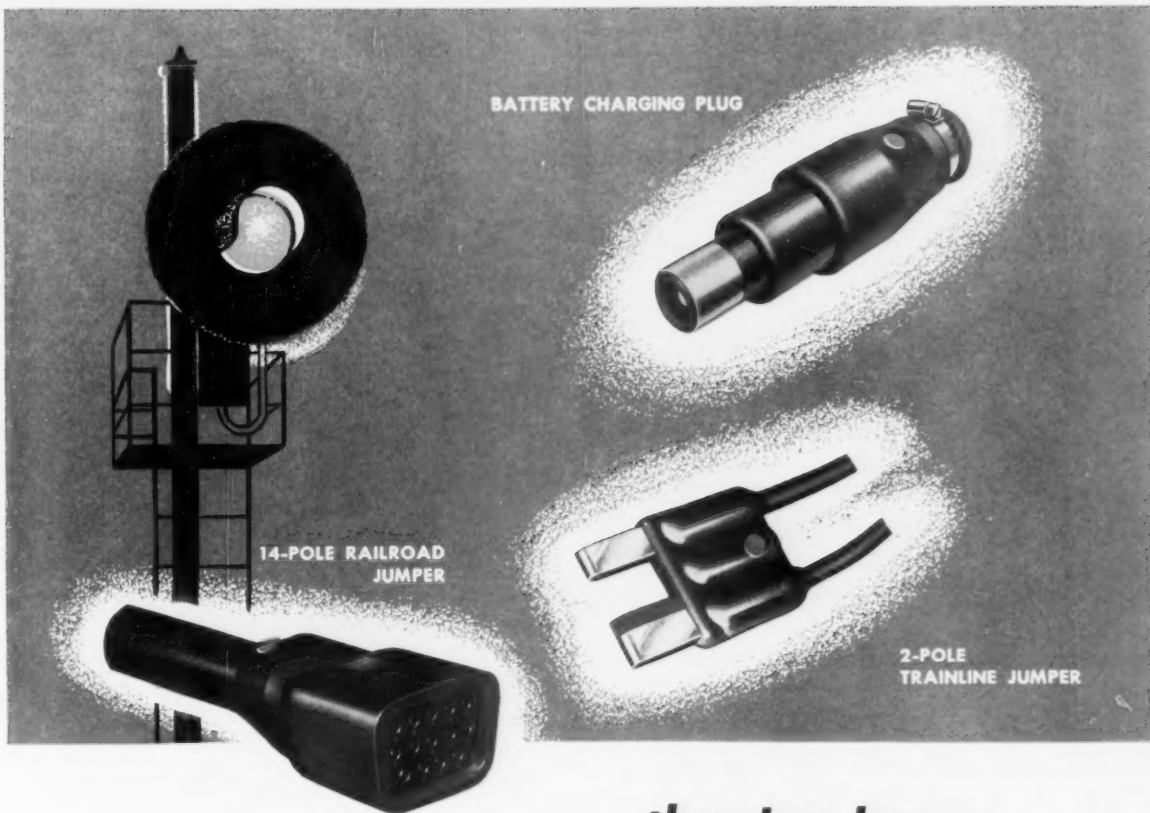


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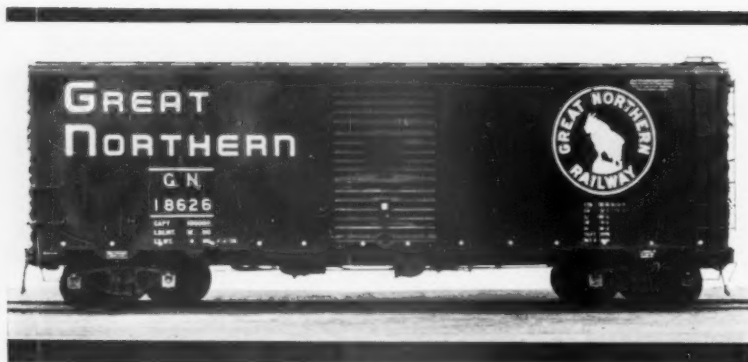
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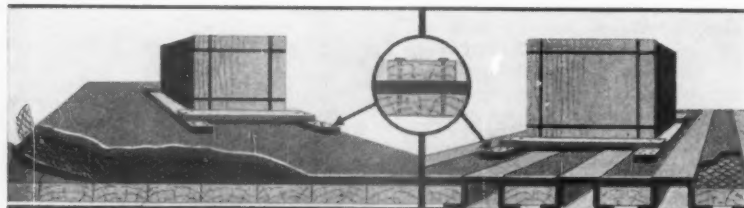
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dustrial sales engineers—Mr. Brown in Baltimore, Philadelphia and the eastern United States; Mr. Simpson in Baltimore, Washington, and points south. Mr. Brown formerly with the Flannery Bolt Company; Mr. Simpson, with Hyatt Bearings Division, General Motors Corporation.

SCULLIN STEEL COMPANY.—Thomas W. Pettus, executive vice-president, named president.

GENERAL MOTORS DIESEL LIMITED.—Andrew Younger appointed district engineer at Winnipeg, Man., succeeding G. Norman Bennett, transferred to Toronto, Ont.

HUCK MANUFACTURING COMPANY.—Ray V. Clute, western division sales manager, appointed assistant to the vice-president—sales.

UNITED STATES RAILWAY EQUIPMENT COMPANY.—Ralph M. McLean, Jr., Progress Railway Supplies, Inc., St. Louis, Mo., appointed sales representative to the railroads in St. Louis area.

WHITING CORPORATION.—Robert S. Hammond, vice-president, Chicago, retired.

MAGNUS CHEMICAL COMPANY.—Dr. Robert J. Rohr appointed director of research and development at 2155-57 West Hubbard street, Chicago.

VAN DER HORST CORPORATION OF AMERICA.—Dr. Hyman Chessin appointed director of research and development. Lee Alderuccio succeeds Dr. Chessin as assistant director of research and development.

TURCO PRODUCTS, INC.—Ground has been broken in Wilmington, Calif., for an administration building and executive wing, a research center, and an engineering service building. Scheduled for completion next summer.

EX-CELL-O CORPORATION.—Frank W. Hughes appointed Railroad Division representative in Philadelphia area, with offices at 987 Suburban Station Building.

A. M. BYERS COMPANY.—James A. MacDonald appointed representative in Toronto.

Obituary

J. V. CONWAY, western sales manager, Transportation Seating Division of Heywood-Wakefield Company, died October 6.

What's New

(Continued from page 14)

Single-Stage Regulators

The Airco 9900 Series of single-stage inverse type station regulators are designed for handling an inlet pressure up to 300 psi. They are said to provide accurate pressure regulation with practically no fluctuation in delivery pressure, because of low friction

Research Finds Extra Dollars of Income Through Savings in Maintenance!

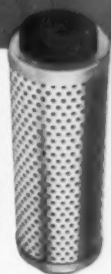
IMPROVED FILTRATION IMPORTANT AREA FOR DEVELOPING OPERATING ECONOMIES

ANALYSIS OF TYPICAL SLUDGE IN DIESEL LUBRICATING OIL

Oxidized Oil (Resins)	19.0%
Amorphous Carbon (Soot)	34.0
Miscellaneous Metals	0.8
Silica	0.2
Water	3.0
Lubricating Oil	43.0



Shown at the left—the famous WIXITE Primary Fuel Filter Cartridge, long recognized for extra protection and extra mileage. At the right—the New WIX POROSITE Second Stage Fuel Filter which completely changes standards of performance in the filtration of Railroad Diesel Fuel Oil.



The analysis shown is that made of sludge deposits taken from a Diesel engine crankcase and it should be borne in mind that the percentages shown will vary substantially with: A) Different engines, B) Various types of service, C) Differing geographic areas and D) Efficiency of filters.

WIX Filter Cartridges are available in a broad selection of filtrants to enable maintenance technicians to prescribe precisely the filtering formula suited to the individual engine, conditions of service, etc.

Thus, with WIX Cartridges, higher filtering efficiency for each unit returns definite advantages in performance and direct economies.



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When it comes to immobilizing a Diesel Locomotive, an avalanche is neither more definite nor more costly than "just a little" dirt in Fuel or Lubricating Oil. The fact is—the "just a little" dirt costs America's Railroads infinitely more than all other catastrophes put together.

WIX Research is directed toward the twin objectives of: A) Filtration that reduces wear in engine moving parts, and B) Higher engine performance and extended periods between overhaul.

WIX Prescription Filtration includes new developments that promise definite and substantial savings in operating and maintenance costs. Laboratory and Field Tests point to improved operating efficiency, less time in the shop and less frequent lay-ups, lower filter cost per hundred miles. Yes, WIX Research Finds Extra Dollars of Income for You in Dollars You Save in Maintenance.

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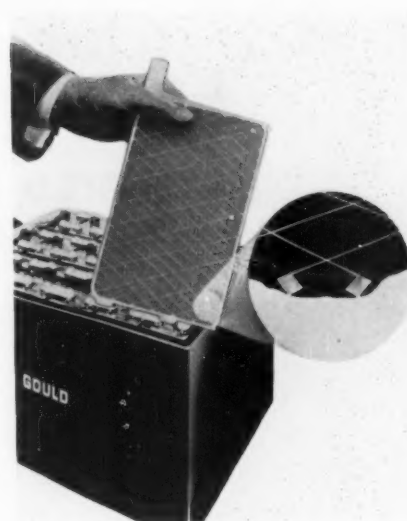
City Zone State

in the internal mechanism and large effective area of the flexible diaphragm used.

The regulator body is a machined brass forging with a hexagon section that simplifies disassembly. The aluminum spring case is fastened to the regulator body by a forged-brass retaining ring. Hand tightening of this ring seals against leakage by means of a rubber ring which is part of the molded rubber diaphragm. For maximum strength and performance, the diaphragm has a nylon fabric insert. The adjusting screw is a forged brass knob with ribbing for a sure grip. *Air Reduction Sales Company, a division of Air Reduction Company, Dept. RLC, 150 East 42nd st., New York 17.*

Silconic Battery Plate

A Silconic battery plate that will deliver greater battery performance at lower cost and retard the tendency toward grid growth in motive-power batteries has been made possible by the development of a patented process for introducing arsenic and silver-cobalt sulphates into the active materials of positive plates. When added to the active materials, the silver and cobalt migrate to all positive grid members and collect on the grid members to form an insoluble oxide surface or protective sheath impervious to acid and oxygen. This oxide coating prevents the most common cause of battery failure—grid separations.



The new plate is said to result in industrial storage batteries having 10-25 per cent longer life and improved electrical characteristics.

In applications where batteries are idle for periods of time, the Silconic plate prevents migration of materials to the negative plate, reducing self discharge within the cell. Comparative tests between Silconic and conventional plates show that the Silconic plate maintains maximum capacity for a greater portion of its service life.

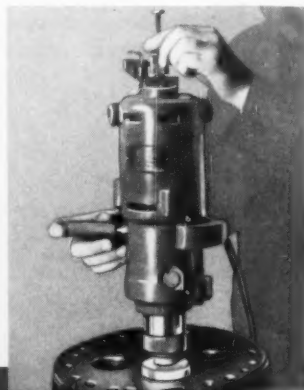
All models of the Thirty, Kathanode and Super Dreadnaught line of batteries will be available with the new grid. *Gould-National Batteries, Inc., Dept. RLC, Trenton, N. J.*

NOTHING EQUALS THE ECCENTRIC METHOD OF VALVE SEAT GRINDING EXCLUSIVE WITH

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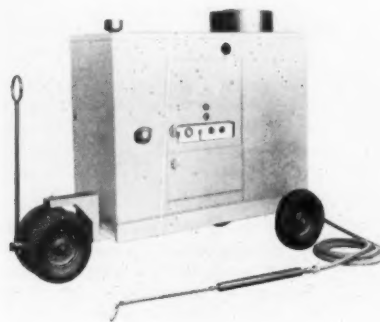


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Only Hall-Toledo's EDP Valve Seat Grinder can absolutely assure the finest performance results by providing perfect valve seating.

Whether you do your own valve work or have a diesel engine service organization handle it, be certain that HALL-TOLEDO equipment is used for faster, factory approved precision valve seat grinding. The MODEL EDP, especially designed for heavy duty diesel engines, will handle grinding wheels from 2" to 7" diameter. The Model EJ HALL-TOLEDO VALVE SEAT GRINDER is also available to precision grind smaller valve seats.

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Steam-Hydraulic Cleaner

Heavy machinery and equipment is said to be cleaned from four to six times faster by the "3500" Series Hypressure Jenny. Eleven different cleaning actions are possible by the movement of a single lever in the new unit. Outlet pressures and temperatures are job-powered . . . up to 250 gal per hr as a steam cleaner; up to 360 gal per hr as a hydraulic cleaner. The series comes in trailer-mounted, shop portable, or stationary models, with a choice of oil or gas for fuel. The shop portable model is 81½ in. long, 40½ in. wide, and 59 in. high. It weighs approximately 1,180 lb. *Hypressure Jenny Division, Homestead Valve Manufacturing Company, Dept. RLC, Coraopolis, Pa.*

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information write direct to the manufacturer.

PORTABLE DISTRIBUTION SYSTEMS FOR ELECTRIC LIGHTING AND POWER. Loose-leaf catalog gives complete information on Tuffline systems and component products. Pages showing examples of complete systems refer reader to page where component parts, molded of a special neoprene compound, are shown by drawings and described in detail. (Write: *Whitney Blake Company*, Dept. RLC, 1565 Dixwell ave., New Haven 14, Conn.)

PISTON RINGS. Three new catalog listings of Pedrick piston rings are: Form 376, which covers, by makes and models, diesel engines currently operated by most railroads, with Piston rings for each identified by part number, size, design type and description. Form 377 covers, by makes and models, air compressors used on diesel locomotives and identifies required piston rings. Form 378 is a net price sheet. (Write: Dept. SRA, *Wilken Manufacturing Co.*, Dept RLC, Philadelphia 42.)

ALUMINUM WELDOR'S TRAINING MANUAL. 144-page booklet gives detailed instructional information designed to train and qualify individuals in welding aluminum by inert gas process. First section deals with tungsten-inert-gas and metal-inert-gas welding techniques. Types of equipment and supplies needed, welding practices, recommended filler material, preheat temperatures, etc., tabulated.

Second and third sections offer 23 practical step-by-step exercises to follow for proficiency in both methods, with photographs, schematic drawings and sectional micrographs of metal-to-metal-fusion. Methods of preparing sections and instructions for bend testing weldments included. Booklet free when requested on company letterhead; \$1.00 otherwise. (Write: *Kaiser Aluminum & Chemical Sales, Inc.*, Dept. RLC, 919 N. Michigan ave., Chicago.)

FLEXIBLE COATED INSULATION. 4-page folder contains technical data on electrical and physical properties of Fibremat flexible coated insulation. (Write: Dept. D8-342, *Irvington Division, Minnesota Mining & Manufacturing Co.*, Dept. RLC, 900 Bush st., St. Paul 6, Minn.)

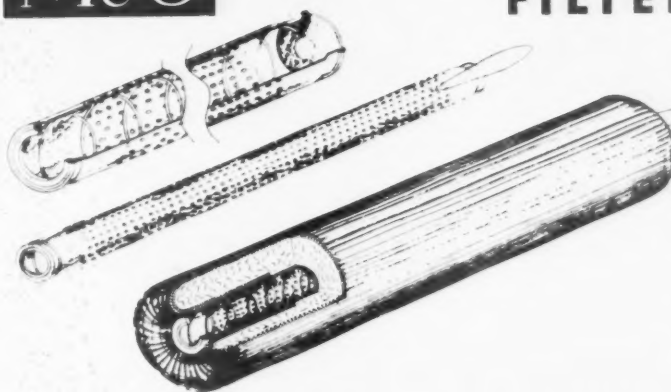
STEAM HEATING CONNECTIONS. 4-page Catalog 99 includes construction details and data on types and sizes of flexible ball joint steam heating connections both for old and new passenger cars and locomotives. (Write: Dept. R-2, *Barco Manufacturing Company*, Dept. RLC, 500 North Hough st., Barrington, Ill.)

TANDEM WELDING. Bulletin 5200.2 describes multiple electrode submerged arc tandem welding process, its advantages and requirements. (Write: *Lincoln Electric Company*, Dept. RLC, Cleveland 17.)

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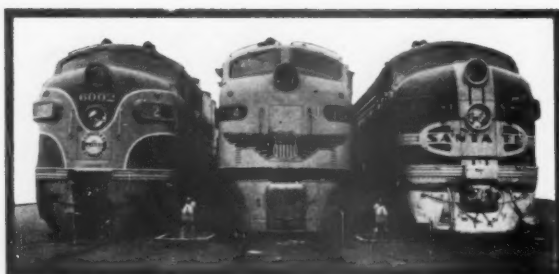


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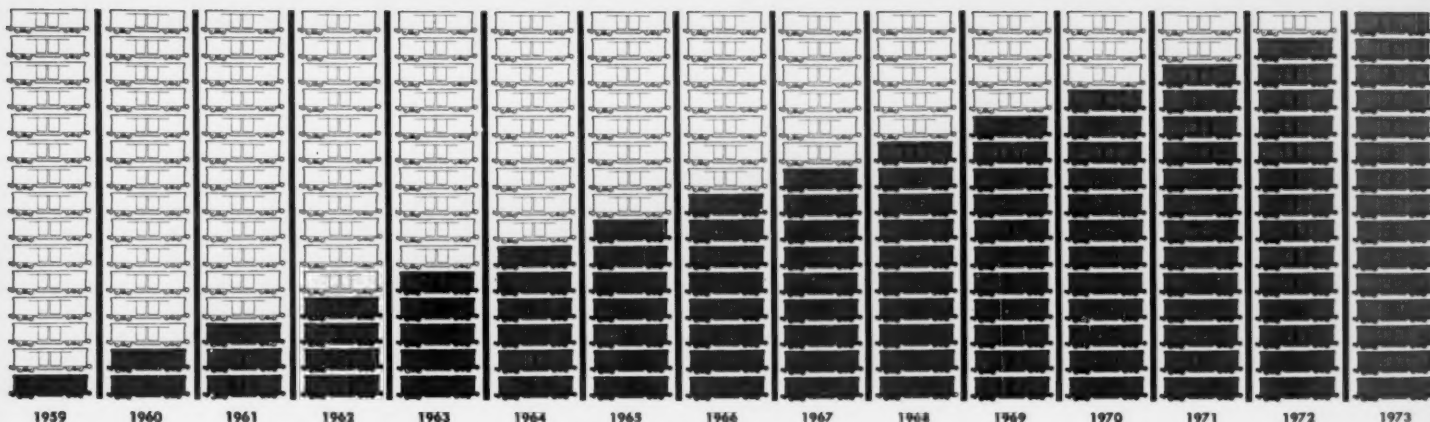
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HERE'S A PLAN that will save railroads \$288,000,000 a year!*

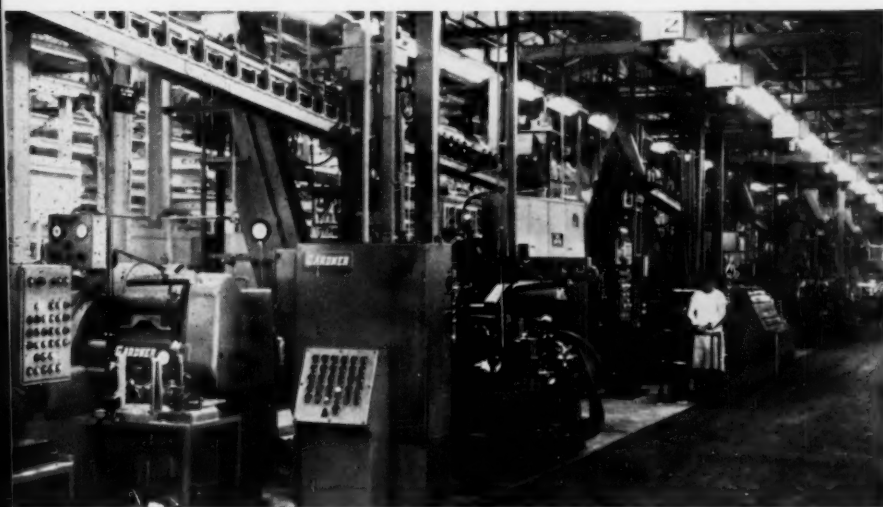
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*Based on 1958 labor and material costs. At anticipated 1973 costs, 15 years from now, savings would rise to an estimated \$610,000,000.



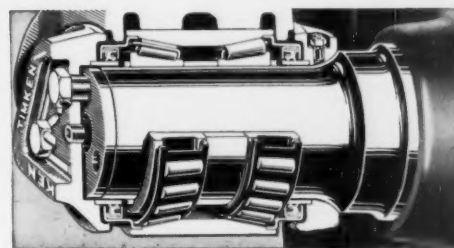
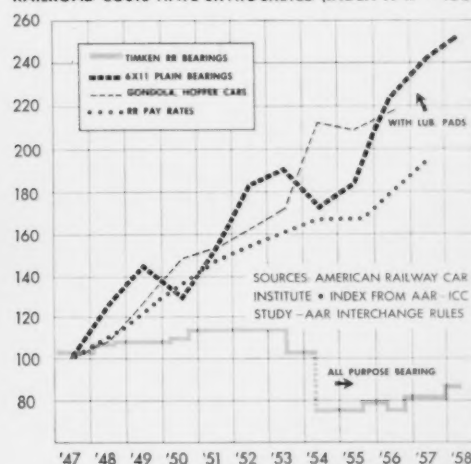
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